Center for Night Vision and Electro-Optics

AMSEL-NV-TR-0082

RELIABILITY TESTING ON THE CTI - CRYOGENICS 1 WATT INTEGRAL COOLER (HD-1033C/UA)

by

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This final report describes and provides the data on the reliability testing of the CTI - Cryogenics 1 Watt Integral Stirling Cooler (HD-1033C/UA). The common module 1 Watt Integral Cooler is currently used in the M1 FLIR, M60 FLIR, and the Advanced Attack Helicopter FLIR.

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TABLE OF CONTENTS

SECTION I. PURPOSE

The US Army CECOM Center for Night Vision and Electro-Optics (C^2NVEO) is responsible for developing cryogenic coolers for all infrared imaging systems for the Army. C^2NVEO also maintains configuration management control of the forward-looking infrared (FLIR) Common Module coolers used in thermal imagers in fielded Army weapon systems such as: M60A3 and M1 Tanks, Bradley Fighting Vehicle System, tube-launched, optically tracked, wire-guided (TOW) Missile System, and Army Attack Helicopters. Currently, there are over 30,000 coolers in fielded systems and several thousand more are added each year. C^2NVEO conducts development programs and monitors contractor internal research and development efforts to improve cooler performance such as reliability, audio noise, power consumption, and output vibration. The 1 Watt Integral (HD-1033C/UA) specification originally had a reliability requirement of a specified mean time between failure (MTBF) of 1,160 hours. In order to satisfy this requirement, the coolers were run in accordance with MIL-STD-781B, *Test Plan IVA*. Under this test plan, it was possible to meet the requirement of the specification by testing three coolers for only 344 hours each. Because of the confusion associated with the original specifications and testing, the CECOM Center for Night Vision and Electro-Optics (C^2NVEO) revised the specification in order to better state and test the reliability requirement. The reliability requirement for the 1 Watt Integral (HD-1033C/UA) is now a lower mean time to failure (MTTF) of 1,000 hours and now to satisfy the requirement, three coolers must be run a total of 3,000 hours.

The purpose of the test was to randomly select three CTI-Cryogenics 1 Watt Integral Coolers and check for conformance to the new specification reliability requirement.

SECTION II. DESCRIPTION

The reliability demonstration test was conducted on three CTI 1 Watt Integral Coolers (HD-1033C/UA) in accordance with the parameters below:

- Temperature: -32°C (-5°C, +2°C) to +52°C (+5°C, -2°C)
- Temperature Cycling (as depicted in Figure 1)
- Cooler On/Off Cycling (as depicted in Figure 1)

The equipment used by C^2NVEO to conduct the reliability tests was comprised of three major elements:

- An automatically controlled high/low temperature chamber.
- A microprocessor which was programmed to automatically cycle the temperature in the chamber in accordance with Figure 1 while operating the coolers at the required ambient temperature.
- An automated data logger which sensed, processed, and recorded the required data.

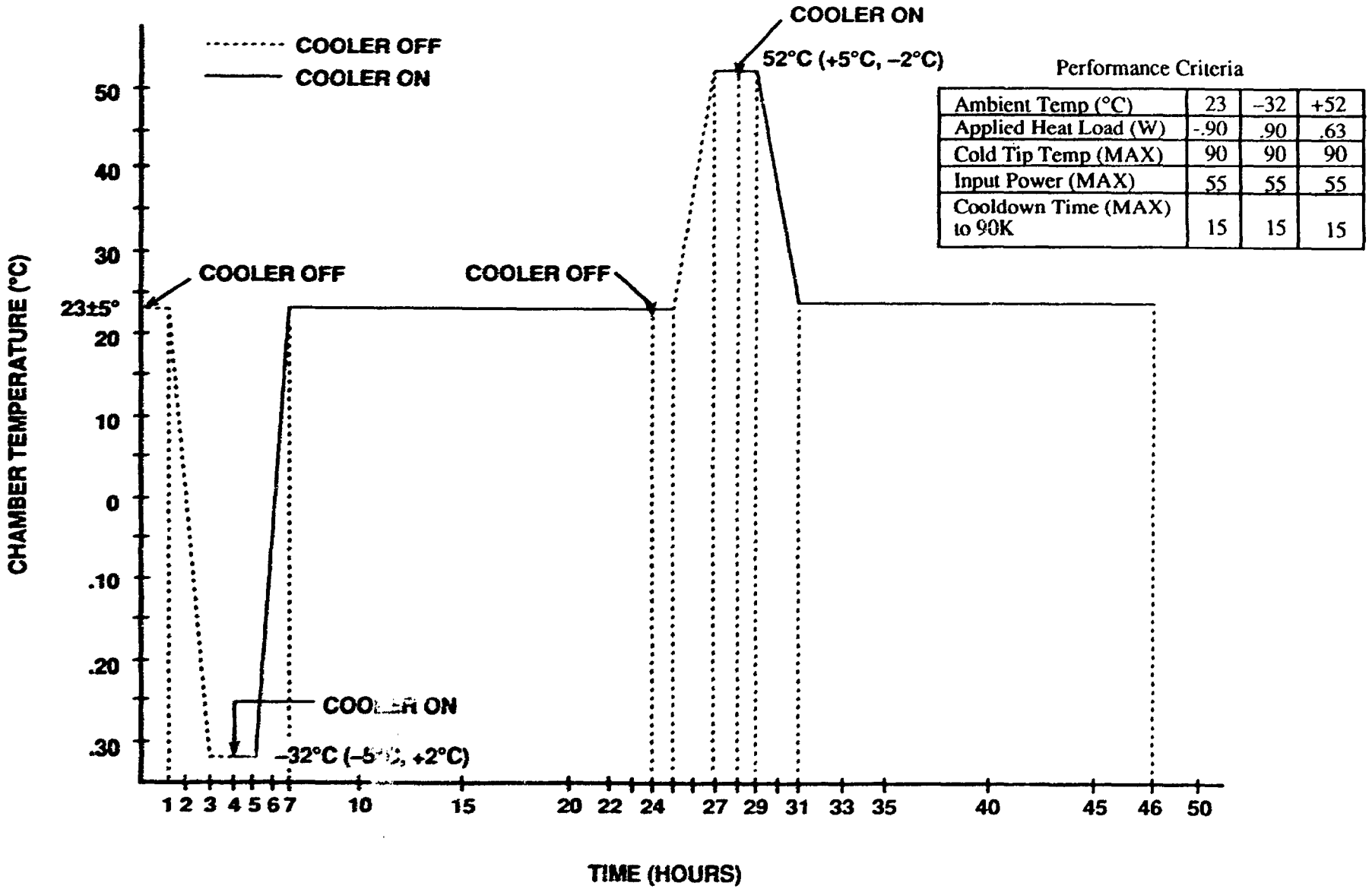


Figure 1. Reliability Test

The three coolers were instrumented in accordance with paragraph 5.2 of the *Reliability Test Procedures, One Watt Integral Cooler,* dated 8 May 1987 (Appendix A). The following test performance data was measured and recorded by the data logger:

- Elapsed time from start-up (min-sec)
- Test chamber ambient temperature (°C)
- Cooler housing temperature (°C)
- Coldfinger tip temperature (°K)
- Applied heatload (Watts)
- Applied voltage (VAC)
- Cooler input current (Amps)
- Cooler input power (Watts).

SECTION III. SUMMARY

The reliability test was started in the end of June 1987. For the next several months, the testing was hindered with test incidents due to weather-related power failures or interrupts. A detailed chronology of the reliability test is provided in Section IV.

The goal of this testing was to demonstrate that the CTI-Cryogenics 1 Watt Integral Cooler (HD-1033C) could meet the reliability requirements of the military specification. Due to a test equipment malfunction, the coolers were exposed to severe heat for an extended period of time (see photographs in Appendix B) during cycle 25. At the time of the incident, each cooler had approximately 850 hours of "on" time. Unfortunately, the exposure damaged the indium seals of all three coolers necessitating a repair action on the units. In an effort to try to maintain the integrity of the test, however, the only repair action performed on the coolers was replacement of the indium seals. At the time of disassembly, it was noted that two units (2 and 3) showed excessive particulate contamination from the piston scoring the piston liner (see Appendix B). Prior to cycle 25, it was observed that these two units' performance levels were beginning to degrade.

The third unit was in excellent condition and its performance level had not degraded prior to cycle 25.

After the repair, the coolers were run for four more cycles at which time units 1 and 3 were still meeting the specification requirements, and unit 2 had failed. The test was stopped due to a requirement to perform life testing on other coolers and the fact that the post-cycle 25 test information had limited value since the coolers had been damaged and then repaired. The results of the testing are summarized on page 4.

COOLER UNIT NUMBER	"ON" HOURS PRIOR TO OVERHEAT	TOTAL "ON" HOURS COMPLETION OF TEST	FINAL STATUS
1	853.9	1,028.9	Still within specifications
2	850.9	970.9	Failed
3	853.9	1,008.9	Still within specifications

Based on their performance levels prior to the overheat failure and examination of the units after the failure, it can be stated that these units had an excellent chance of satisfying the 1,000-hour reliability requirement before the failure. However, since the failure was due to a test equipment malfunction, the repair was allowable, and the units technically met the 1,000-hour requirement.

SECTION IV. TEST DATA AND RESULTS

Coolers were leak rate tested on 26 June 1987 before the start of the reliability testing.

COOLER UNIT NO.	S/N	LEAK RATE	
1	7171	8.0×10^{-10}	STD CC/SEC (Air Leak Rate Equivalent)
2	7173	5.0×10^{-10}	STD CC/SEC (Air Leak Rate Equivalent)
3	7175	7.5×10^{-10}	STD CC/SEC (Air Leak Rate Equivalent)

The reliability test cycling was started on 28 June 1987. The chamber temperature cycling was controlled to conform to Figure 1 (page 2) as was the cooler on/off cycling. Table 1 provides a summary of each cycle and highlights the cooler "on" time and incidents, if any. Table 2 provides the leak rate data for each of the coolers.

During cycle 25, the chamber temperature far exceeded the high temperature limit of 57°C for an extended period of time. Extensive damage was done to the test equipment and the cooler's indium seals (see photographs in Appendix B). Since this was a test equipment failure that caused the failure of the coolers, it was decided to replace the six static seals in each of the coolers. No other repair action was performed on the coolers. The test chamber was refurbished and the test restarted.

Table 1. Summary of Testing

CYCLE	START DATE (1987)	COOLER "ON" TIME (hours)	CYCLE HOURS	REMARKS
1	28 June	40	48	
2	30 June	40	48	
3A	2 July	2	6	*
3	7 July	26.67	28.67	**
4	10 July	23.5	31.5	**
5	13 July	40	48	
6	15 July	40	48	
7	22 July	40	48	
8	24 July	40	48	
9	26 July	32	40	*
10	29 July	40	48	
11	31 July	40	48	
12	2 August	40	48	
13	4 August	22.75	26.75	*
14	5 August	40	48	
15	7 August	40	48	*
16	11 August	18	22	***
17	12 August	20	24	***
18	14 August	40	48	
19	16 August	40	48	
20	18 August	40	48	
21	22 August	40	48	***
22	27 August	36	44	****
23	1 September	24	32	****
24	4 September	40	48	
25	6 September	3	7	***
26	30 September	40	48	
27	2 December	40	48	
28	7 December	40	48	
29	14 December	35	43	

* – Power failure, test equipment shut down
** – Test equipment failed
*** – Test program failed
**** – Cycle terminated to check vacuum leak

Table 2. Cooler Leak Rate Tests

TEST DATE (1987)	LEAK RATE (Scc He/Sec Air Leak Rate Equivalent) COOLER 1 (S/N 7171)	COOLER 2 (S/N 7173)	COOLER 3 (S/N 7179)
26 June	8.0×10^{-10}	5.0×10^{-10}	7.5×10^{-10}
28 July	2.6×10^{-10}	6.0×10^{-10}	4.0×10^{-10}
10 August	1.5×10^{-9}	6.5×10^{-10}	6.3×10^{-10}
25 September	1.5×10^{-9}	1.4×10^{-9}	1.4×10^{-9}

APPENDIX A

RELIABILITY TEST PROCEDURE

RELIABILITY TEST PROCEDURE

ONE WATT INTEGRAL COOLER

8 MAY 87

Approved by:

CNVEO Cooler
Project Leader

Approved by:

CECOM PA&T
CNVEO Branch

1.0 SCOPE

This document establishes the procedure to be followed for the reliability testing of the one watt integral cyrogenic coolers.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this test procedure to the extent specified herein. In the event of any conflict between this document and the documents specified herein, this document shall take precedence.

MIL-STD-781C Reliability Tests, Exponential Distribution

MIL-C-45662, Calibration Standards

MIL-C-49175B, Specification for Cooler, Cryogenic, dated 6 Mar 86

3.0 QUALITY ASSURANCE PROVISIONS

3.1 Test Surveillance. CNVEO Product Assurance will provide test surveillance/auditing to certify accuracy of data collected including verification of test equipment. Instrumentation, tooling and test fixturing shall be verified to be capable of meeting MIL-C-45662, Calibration Standards.

4.0 TEST EQUIPMENT

4.1 Environmental Chamber

4.2 High Vacuum Station

4.3 Ionization Gauge, Veeco #RG-75K (or equivalent)

4.4 Vacuum Gauge, Varian #841 (or equivalent)

4.5 HP 9000 mini computer

4.6 Heat Station Assembly

4.7 Heater/Diode Power Supply

4.8 ELGAR AC Power Supply

4.9 Lakeshore Temperature Sensing Equipment

4.10 Miscellaneous Equipment

5.0 PERFORMANCE TEST

5.1 Test Purpose. The performance test shall be performed to verify cooler performance at +23°C ± 5°C prior to conducting the reliability test. Running time accumulated during the performance test will not be applied to the total elapsed time when calculating the demonstrated MTTF hours.

5.2 Test Instrumentation.

5.2.1 Those parts of the test fixtures and test equipment that are in contact with the coolers shall be visually inspected prior to and during use to insure that they are free of oil, grease, soil, or other contamination. All test instrumentation used shall be calibrated within the requirements of MIL-C-45562.

5.2.2 The mass applied shall be as defined in the MIL-C-49175B Cooler Specification. The mass which shall include a diode (temperature sensor) and an integral heater shall have a total thermal mass equivalent to 1440 joules over the temperature range of 300K to 80K. The mass shall be attached via a clamp screw to the tip of the coldfinger.

5.2.3 The electrical voltage for operating the cooler shall be 117 ± 2 VAC.

5.2.4 The instrumentation mounted at the tip of the coldfinger assembly shall be immersed in an ice bath and then in a liquid nitrogen bath in order to define the calibration curve.

5.2.5 Prior to start of the performance test the Dewar assembly shall be evacuated to a vacuum level of $1.0X10^{-4}$ Torr or better.

5.2.6 Heat sinking of the coolers shall be sufficient to limit the housing temperature to 15°C above ambient.

5.3 Stabilization. The coolers shall be considered stable when the coldfinger temperature is within ± 3°C of the test chamber ambient temperature for a period of 15 minutes with the coolers in the non-operating mode.

5.4 Test Requirement. The test shall consist of instrumenting the cooler in accordance with Paragraph 5.2 of this test plan to measure the cooldown time and refrigeration capcity of the coolers. The following performance data shall be measured and recorded.

- Elapsed time from start up, Min-Sec.
- Test chamber temperature, °C.
- Cooler housing temperature, °C.
- Coldfinger temperature, Kelvin
- Applied heat load, watts.
- Applied voltage, VAC.
- Input current, Amps
- Input Power, Watts

5.5 Test Mounting. The three (3) coolers shall be mounted in a suitably designed holding fixture. The cold ends shall be instrumented for operation in accordance with Paragraph 5.2 of this test plan, and installed in a Dewar capable of achieving a vacuum level of $1.0X10^{-4}$ Torr or better.

5.6 Performance Test Procedure. The performance test shall be conducted at $+23^{o} \pm 5^{o}C$.

Insure coolers are instrumented in accordance with Paragraph 5.2 of this test plan.

Step 1: Establish test setup.

Step 2: After the coolers have stabilized, energize the coolers. Record all applicable data.

Step 3: Energize coolers and allow to cooldown with no applied heat load. Record data when the coldfinger temperature reaches 80K. This shall conclude the cooldown test.

Step 4: Allow the cooler to operate for 20 minutes with no applied heat load. After 20 minutes has elapsed, record all applicable data.

Step 5: After 20 minutes of operation, apply a 1.0 watt heat load. Allow the cooler to operate for an additional 20 minutes.

Step 6: Record data at the time the heat load is applied, at 10 minute intervals, and at the end of the required time period. This shall conclude the refrigeration capacity test.

Step 7. Deenergize coolers.

5.7 Performance Test Criteria.

5.7.1 Cooldown Time. The cooldown time to reach a cold tip temperature of 80K with a 1440 joule thermal mass load shall be 15 minutes maximum.

5.7.2 Cooling Capacity. The coolers shall provide 1.0 watt minimum net refrigeration at 80K.

5.7.3 Input Power. The power consumed by each cooler shall be equal to or less than 50 watts when the cold tip temperature is at 80K or below with heat load applied.

5.7.4 Leak Rate. The leak rate shall not exceed $2.5X10^{-6}$ std. cc helium/sec when measured at $+23^{o}C \pm 5^{o}C$.

6.0 RELIABILITY DEMONSTRATION TEST

The reliability demonstration test will be conducted in accordance with the parameters listed below:

- Temperature: -32°C (-5°C, +2°C) to +52°C (+5°C, -2°C)
- Temperature Cycling: as depicted in Figure 1.
- Unit on/off Cycling: as depicted in Figure 1.

6.1 Reliability Test Concept: CNVEO will conduct the reliability tests using environmental test equipment. The equipment will be comprised of three (3) major elements.

- An automatically controlled high/low temperature chamber.
- A microprocessor which will be programmed to automatically cycle the temperature chamber through the required temperature profile while operating the coolers at the required ambient temperatures.
- An automated data logger which will sense, process, and record the data required.

6.2 Acceptance Criteria During Reliability Testing.

6.2.1 Cooldown Time. The cooldown time to reach a coldtip temperature of 90K with a 1440 joule thermal mass load shall be 15 minutes maximum.

6.2.2 Cooling Capacity. Ability to cool at least 90% of the heatload in accordance with figure 2, curve c at any temperature to 90K or less.

6.2.3 Input Power. The power consumed by each cooler shall be equal to or less than 55 watts when checked at ambient when the cold tip temperature is at 90K or less with heatload applied.

6.2.4 Leak Rate. The leak rate shall not exceed $2.5X10^{-6}$ std. cc helium sec.

6.4 Reliability Demonstration Test. The reliability test shall consist of instrumenting the coolers in accordance with Paragraph 5.2 of this test plan. The following performance data shall be measured and recorded using a data logger preprogrammed to sense, process, and record the required data.

- Elapsed time from start-up, Min-Sec.
- Test chamber ambient temperature, °C.
- Compressor housing temperature, °C.
- Coldfinger tip temperature, Kelvin.
- Applied heatload, Watts.
- Applied voltage, VAC.
- Input current, Amps
- Input Power, Watts

6.5 Reliability Test Procedure. Insure coolers are instrumented in accordance with paragraph 5.2 of this test procedure.

Step 1: Establish test set-up and let set for 1 hour at +23°C ± 5°C.

Step 2: Adjust test chamber ambient to -32°C (-5°C, +2°C) 1 hour into the cycle.

Step 3: Four hours after performing Step 1, energize coolers and record cooldown time. Allow the cooler to operate for 20 minutes with no applied heatload. After 20 minutes has elapsed, apply heatload.

Step 4: Five hours after performing Step 1, adjust test chamber ambient to +23° ± 5°C.

Step 5: Twenty-four hours after performing Step 1, turn the heatload and coolers off.

Step 6: Twenty-five hours after performing Step 1, adjust test chamber ambient to +52°C (+5°C, -2°C).

Step 7: Twenty eight hours after performing Step 1, energize coolers and record cooldown time. Allow the cooler to operate for 20 minutes with no applied heatload. After 20 minutes has elapsed, apply heatload.

Step 8: Twenty nine hours after performing Step 1, adjust test chamber ambient to +23°C ± 5°C.

Step 9: Forty eight hours after performing Step 1, turn the heatload and coolers off.

Repeat steps 2 through 9 over six, forty-eight (48) hour cycles. At the end of each set of six cycles, the coolers will be checked for leakage and a performance test at +23°C will be performed, failure criteria is in accordance with para 6.2. Energizing of the coolers and application of heatload will be computer controlled, as will be the chamber temperature. Data will be logged at least every fifteen minutes. The test set-up and data will be checked at least every four hours during normally scheduled work days to verify performance.

6.6 Reliability Test Length. Only equipment "on" time may contribute to the total unit hours. No single equipment's "on" time shall be less than 500 hours. To demonstrate a 1000 hour MTTF using three (3) coolers, a total of 3000 hours must be accumulated. For determining MTTF compliance no units "on" time shall be greater than 1250 hours. To establish end of life characteristics, testing shall continue until all units have failed or until each cooler has run 2500 hours.

7.0 FAILURE CRITERIA

All failures related to the reliability testing shall be recorded. Each failure shall be categorized as either relevant or non-relevant, as defined below:

7.1 Relevant Failure Criteria: The inability of the unit to meet the conditions described in Paragraph 6.2 shall constitute a relevant failure.

7.2 Non-Relevant Failure Criteria. A failure of the test specimen caused by a condition external to the cooler under test which is not a test requirement and is not encountered in actual service will be classified as non-relevant. These external conditions will include human error, test equipment failures, test instrumentation failures, and power failures.

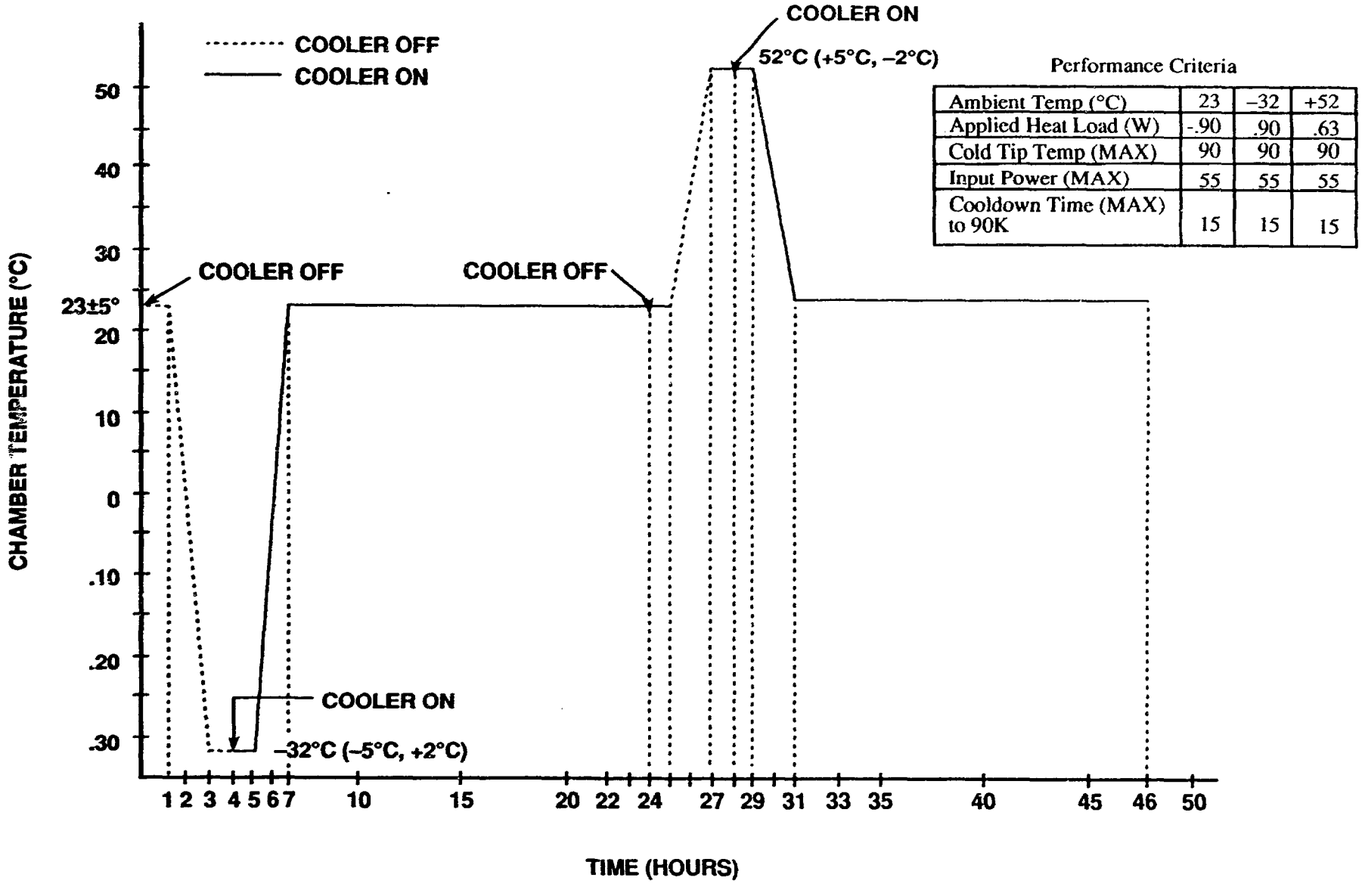


Figure 1. Reliability Test

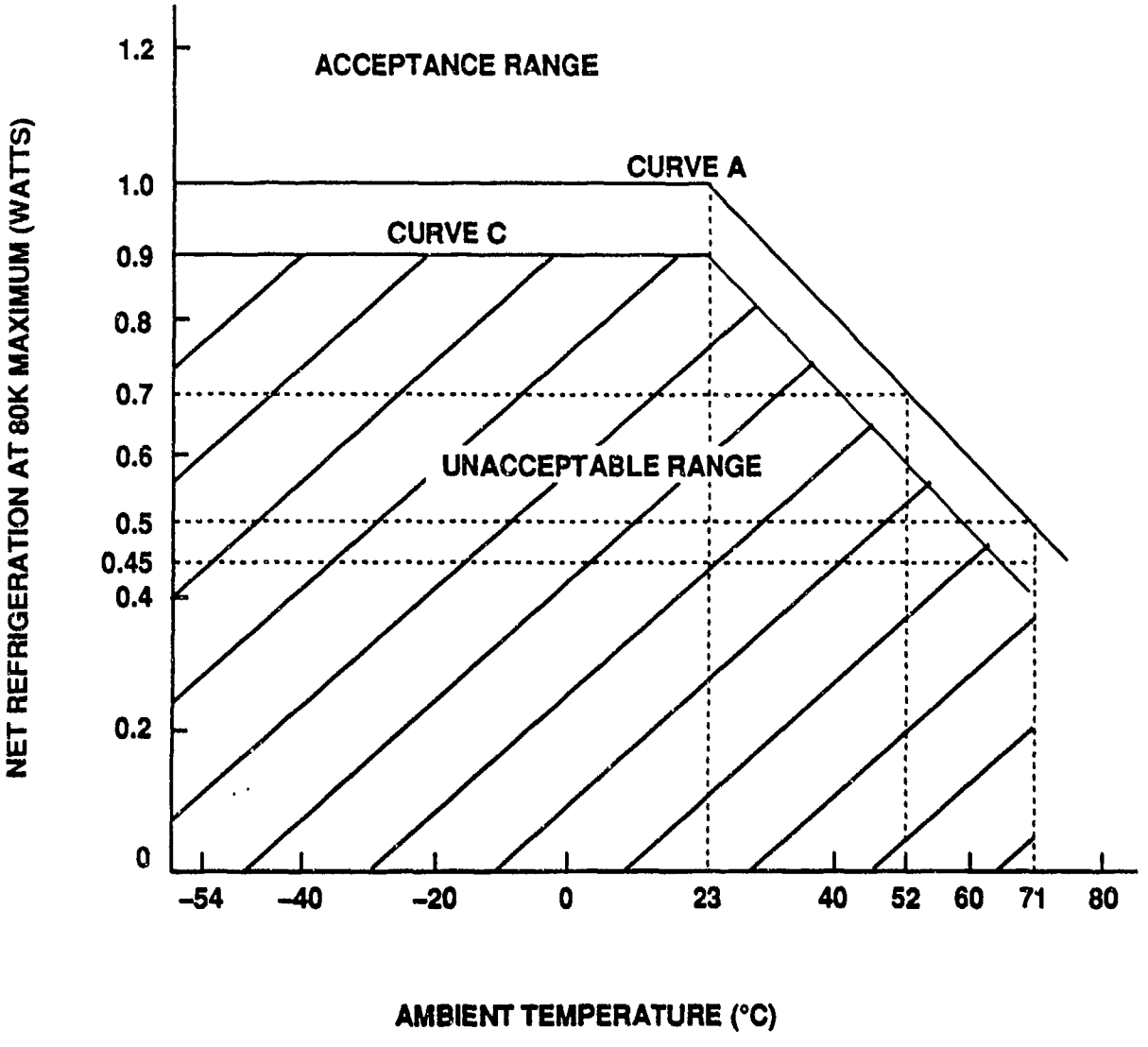
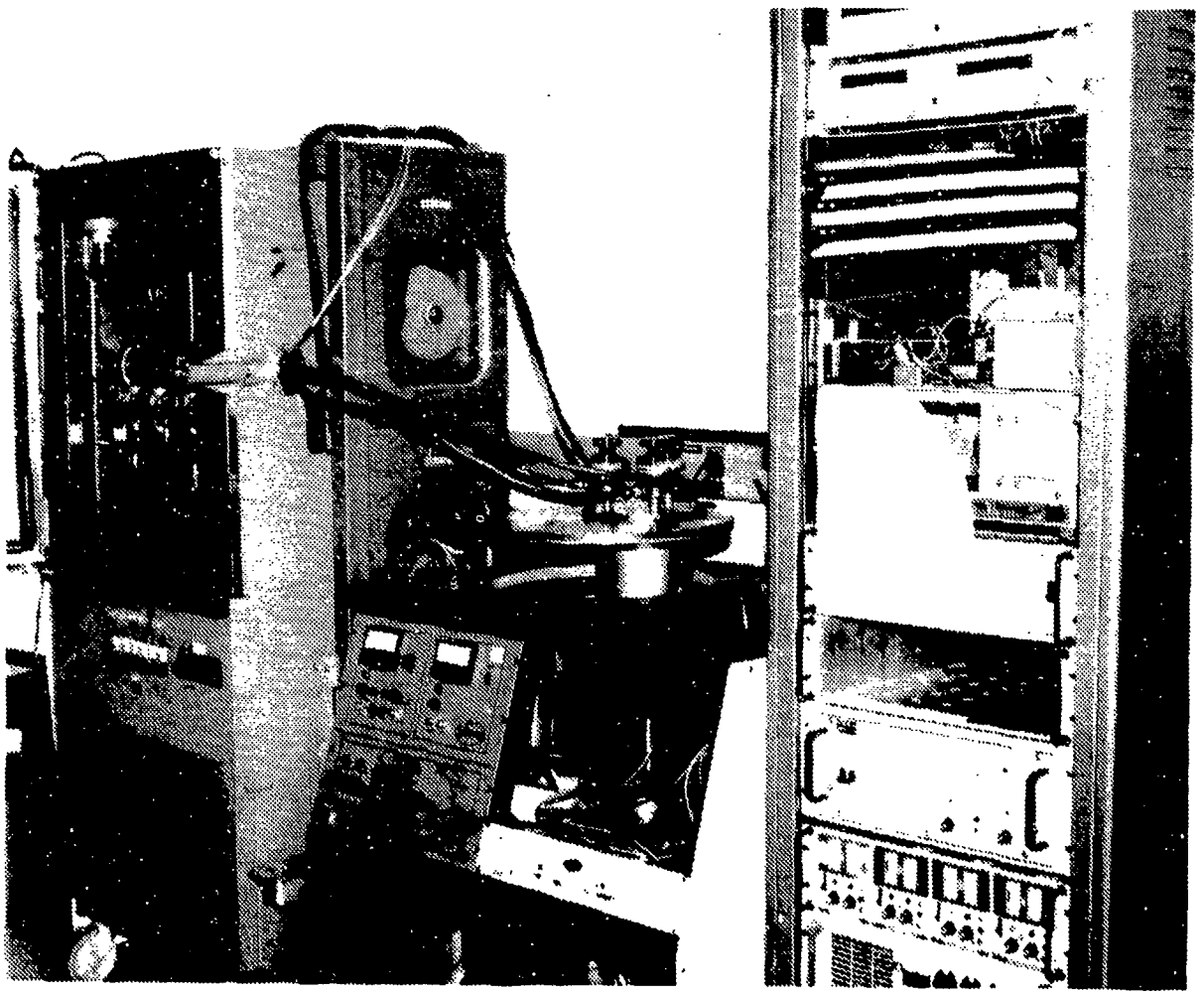
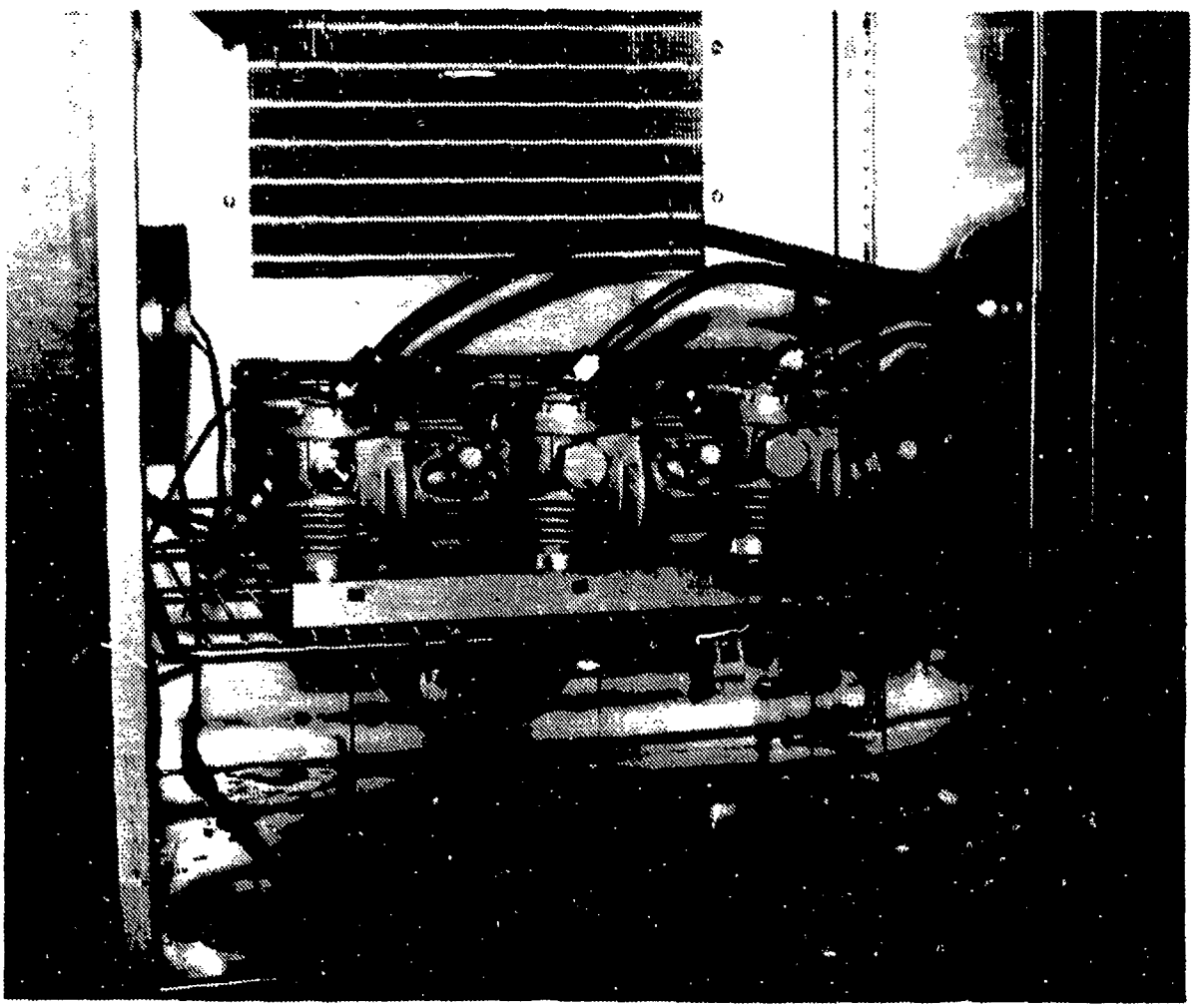
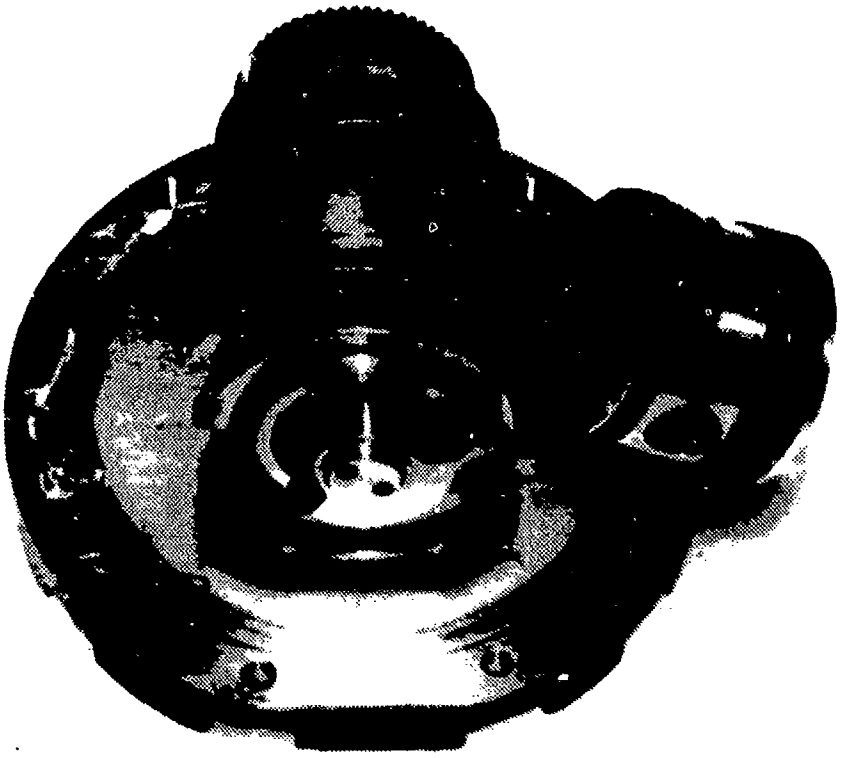


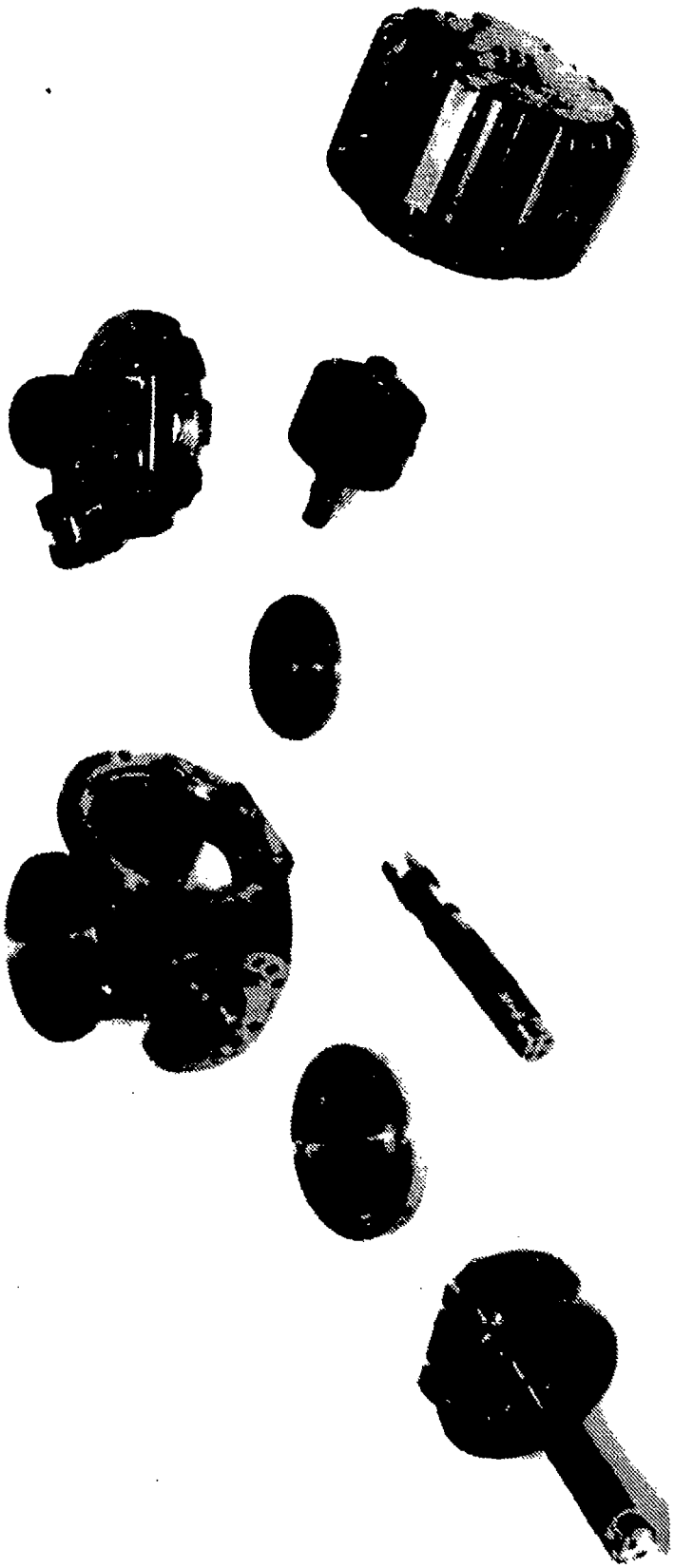
Figure 2. Cooling Capacity

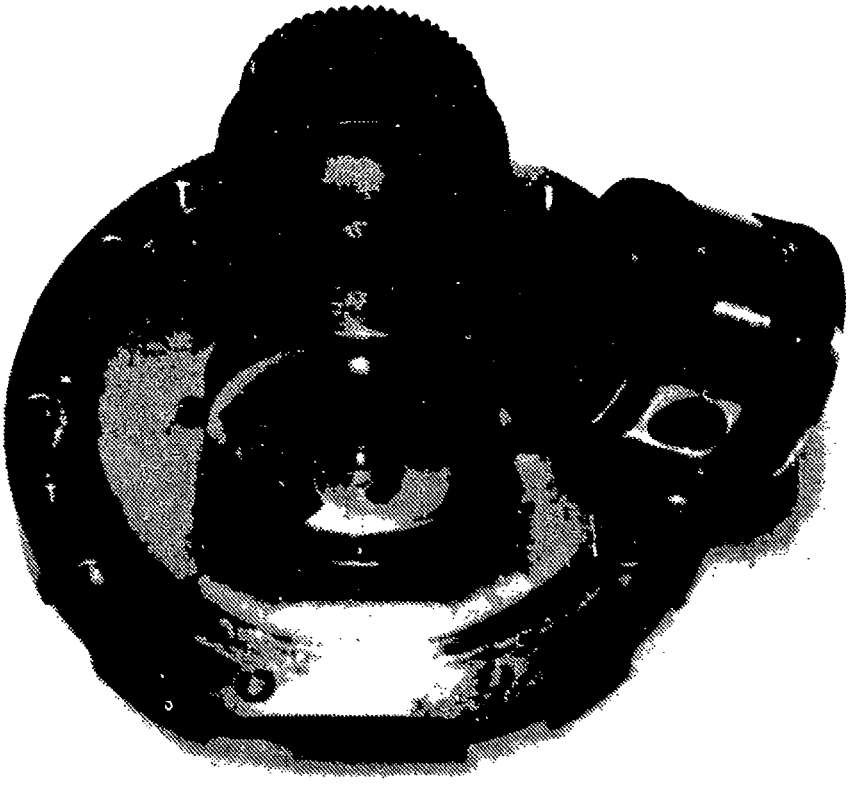
APPENDIX B
OVERHEAT FAILURE PHOTOGRAPHS











APPENDIX C
FAILURE REPORTS

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 1
DATE: 2 December 1987

COOLER S/N: 7171/7173/7175
COOLER OPERATING TIME: 20 hours
DATE OF FAILURE: 29 June 1987
CYCLE NUMBER: 1

INCIDENT/FAILURE:

Computer hung up - chamber temperature never reached +52°C and data was not recorded for 3.5 hours of the cycle (28 hours to 31.30 hours).

FAILURE CLASSIFICATION: RELEVANT: _____ NON RELEVANT: X

REPAIR ACTION/ACTION TAKEN:

The computer program was modified to eliminate this condition. No corrective action was performed on the cooler. Incident is non-relevant since it occurred because of test equipment.

TEST ENGINEER: Hayes K Long
PROJECT LEADER: James Shaffer
QUALITY ASSURANCE: Ron Johnson

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 2
DATE: 2 December 1987

COOLER S/N: 7171
COOLER OPERATING TIME: 62 hours
DATE OF FAILURE: 1 July 1987
CYCLE NUMBER: 2

INCIDENT/FAILURE:

Cooler number 1 exceeded the input power requirement of 55 watts at hour 30.

FAILURE CLASSIFICATION: **RELEVANT:** _____ **NOW RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

No action taken. Since the cooler only exceeded the input requirement at one point (hour 30) in the cycle it was decided to allow the cooler to continue to run.

TEST ENGINEER: Henry Klejs
PROJECT LEADER: [signature]
QUALITY ASSURANCE: Ken Johnson

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 3
DATE: 2 December 1987

COOLER S/N: 7171/7173/7175
COOLER OPERATING TIME: 82 hours
DATE OF FAILURE: 2 July 1987
CYCLE NUMBER: 3A

INCIDENT/FAILURE:

Power failure - thunder/lightning storm knocked out power in the area disrupting the life test. Occurred 6 hours into the cycle.

FAILURE CLASSIFICATION: **RELEVANT:** _____ **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

No action taken. Cycle was aborted and test restarted on 7 July 1987. Non-relevant - act of nature.

TEST ENGINEER: Harry Kluss
PROJECT LEADER: Tanya Shaffer
QUALITY ASSURANCE: Ron Johnson

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 4
DATE: 2 December 1987

COOLER S/N: 7171/7173/7175
COOLER OPERATING TIME: 102 hours
DATE OF FAILURE: 8 July 1987
CYCLE NUMBER: 3

INCIDENT/FAILURE:

Power failure due to storm in the area. The computer stopped recording data 28 hours into the cycle. The coolers continued to run, however for an additional 15 hours at +60°C.

FAILURE CLASSIFICATION: **RELEVANT:** _____ **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

The computer program is being modified to eliminate the over temperature condition. There was a power interrupt that caused the computer to stop recording data, but the set-up continued to allow the coolers to run. No action was taken to correct this condition because of cost and time.

TEST ENGINEER: Henry Klein
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 5
DATE: 2 December 1987

COOLER S/N: 7171/7173/7175
COOLER OPERATING TIME: 125 hours
DATE OF FAILURE: 11 July 1987
CYCLE NUMBER: 4

INCIDENT/FAILURE:

Power failure due to storm in the area. The coolers and cycle stopped at 31 hours into the cycle.

FAILURE CLASSIFICATION: **RELEVANT:** _____ **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

No action taken. Cycle was aborted and test restarted on 13 July 1987.

TEST ENGINEER: Henry K Lin
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 6
DATE: 2 December 1987

COOLER S/N: 7171/7173/7175
COOLER OPERATING TIME: 125 hours
DATE OF FAILURE: 13 July 1987
CYCLE NUMBER: 5

INCIDENT/FAILURE:

Coolers did not start until the 5th hour of the cycle. The coolers did not start because of an incorrect voltage from the 400hz power supply.

FAILURE CLASSIFICATION: **RELEVANT:** _____ **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

The controls have been taped to hopefully eliminate any accidental contact which could cause a incorrect voltage setting. Additionally at the start of each cycle (during the workweek) the voltage is checked.

TEST ENGINEER: Henry Klejo
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 7
DATE: 2 December 1987

COOLER S/N: 7171
COOLER OPERATING TIME:
DATE OF FAILURE: 15 July - 28 July 1987
CYCLE NUMBER: 6 - 9

INCIDENT/FAILURE:

The Lake Shore diode that was measuring the cooler housing temperature malfunctioned.

FAILURE CLASSIFICATION: **RELEVANT:** **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

At the completion of cycle 9 the diode was replaced.

TEST ENGINEER: Henry Kleiff
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 8
DATE: 2 December 1987

COOLER S/N: 7171
COOLER OPERATING TIME:
DATE OF FAILURE: 16 July 1987
CYCLE NUMBER: 6

INCIDENT/FAILURE:

Cooler number 1 S/N 7171 out of limit during the high temperature part of the cycle. The feedthru in the test dewar developed a leak, thus effecting the vacuum.

FAILURE CLASSIFICATION: **RELEVANT:** **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

Test equipment problem. The feedthru was replaced and cooler performance returned to within the specification limit.

TEST ENGINEER: Henry Kluge
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 9
DATE: 2 December 1987

COOLER S/N: 7171/7173/7175
COOLER OPERATING TIME:
DATE OF FAILURE: 27 July 1987
CYCLE NUMBER: 9

INCIDENT/FAILURE:

Power failure due to a storm in the area. The coolers and cycle stopped at 40 hours into the cycle.

FAILURE CLASSIFICATION: **RELEVANT:** **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

No action taken. Cycle was aborted and test restarted on 29 July 1987.

TEST ENGINEER: Henry K Long
PROJECT LEADER: James L Haffner
QUALITY ASSURANCE: Leo Johnson

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 10
DATE: 2 December 1987

COOLER S/N: 7171
COOLER OPERATING TIME:
DATE OF FAILURE: 27 July 1987
CYCLE NUMBER: 9

INCIDENT/FAILURE:

Cooler number 1 S/N 7171 out of limit during hours 38 thru 40 of the cycle. Test dewar developed a leak.

FAILURE CLASSIFICATION: **RELEVANT:** **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

All bolts of the test dewar were retightened and cooler performance returned to within the specification limits.

TEST ENGINEER: Henry Kluiz
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 11
DATE: 2 December 1987

COOLER S/N: 7171/7173/7175
COOLER OPERATING TIME:
DATE OF FAILURE: 5 August 1987
CYCLE NUMBER: 13

INCIDENT/FAILURE:

Power failure due to a storm in the area. The coolers and cycle stopped at 26 hours into the cycle.

FAILURE CLASSIFICATION: **RELEVANT:** **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

No action taken. Cycle was aborted and test restarted on 5 August 1987.

TEST ENGINEER: Henry Klopp
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 12
DATE: 2 December 1987

COOLER S/N: 7171/7173/7175
COOLER OPERATING TIME:
DATE OF FAILURE: 11 August 1987
CYCLE NUMBER: 16

INCIDENT/FAILURE:

Power failure due to a storm in the area. The coolers and cycle stopped at 22 hours into the cycle.

FAILURE CLASSIFICATION: **RELEVANT:** _____ **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

No action taken. Test restarted on 12 August 1987.

TEST ENGINEER: Henry Klopp
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 13
DATE: 2 December 1987

COOLER S/N: 7171/7173/7175
COOLER OPERATING TIME:
DATE OF FAILURE: 12 August 1987
CYCLE NUMBER: 17

INCIDENT/FAILURE:

Data was not recorded from 14 hours to ~3 hours into the cycle.

FAILURE CLASSIFICATION: **RELEVANT:** **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

Software glitch - the program was checked for any possible problems. No action taken.

TEST ENGINEER: Hagop Klig
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 14
DATE: 2 December 1987

COOLER S/N: 7175
COOLER OPERATING TIME:
DATE OF FAILURE: 17 August 1987
CYCLE NUMBER: 19

INCIDENT/FAILURE:

Coldtip temperature above 90K (the failure point) for hours 29 and 30.

FAILURE CLASSIFICATION: RELEVANT: _____ NON RELEVANT: _____

REPAIR ACTION/ACTION TAKEN:

During the high temperature portions of the reliability cycle the heat load should only be .63 Watt. However, for simplicity purposes it was decided to keep the heat load at a constant .90 Watt throughout the cycle. The cooler was baselined at high temperature with a .63 Watt and met the specification requirements.

TEST ENGINEER: Henry K Ervin
PROJECT LEADER: James Schaffer
QUALITY ASSURANCE: Tom Johnson

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 15
DATE: 2 December 1987

COOLER S/N: 7173/7175
COOLER OPERATING TIME:
DATE OF FAILURE: 19 August 1987
CYCLE NUMBER: 20

INCIDENT/FAILURE:

Coldtip temperature above 90K during the high temperature portion of the cycle.

FAILURE CLASSIFICATION: **RELEVANT:** **NON RELEVANT:**

REPAIR ACTION/ACTION TAKEN:

See Failure Report 14.

TEST ENGINEER:
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 16
DATE: 2 December 1987

COOLER S/N: 7173/7175
COOLER OPERATING TIME:
DATE OF FAILURE: 23 August 1987
CYCLE NUMBER: 21

INCIDENT/FAILURE:

Coldtip temperature above 90K during high temperature portion of cycle.

FAILURE CLASSIFICATION: **RELEVANT:** **NON RELEVANT:**

REPAIR ACTION/ACTION TAKEN:

See Failure Report 14. Attached is the baseline data with the coolers at high temperature and a .63 Watt heat load applied.

TEST ENGINEER:
PROJECT LEADER:
QUALITY ASSURANCE:

CYCLE NUMBER: 22 STARTED: 26 Aug 1987 14:47:00

COOLER: 1 BASELINE DATA

MANFACTURER: CTI-7171

DESCRIPTION: HD-10330

TEST DESCRIPTION: RELIABILITY LIFE TEST HIGH TEMP. .63w LOAD

ELAPSED TIME	CHAMBER TEMP	POWER	COOLER FINGER TEMP	COOLER HOUSING TEMP	HEAT LOAD
	(C)	(W)	(K)	(C)	W
0.000	999.00	38.69	999.00	999.00	0.00
1.000	999.00	39.02	999.00	999.00	0.00
2.000	999.00	39.76	999.00	999.00	0.00
3.000	328.53	40.45	240.51	331.51	0.00
4.000	328.69	41.20	217.27	332.45	0.00
5.000	328.75	41.87	196.07	333.27	0.00
6.000	328.83	42.74	176.52	334.01	0.00
7.000	328.93	43.73	158.35	334.65	0.00
8.000	329.80	44.80	141.49	335.39	0.00
9.000	329.55	46.07	125.85	336.83	0.00
10.000	329.56	47.53	111.84	336.51	0.00
11.000	329.64	48.82	99.47	337.05	0.00
12.000	329.74	50.00	89.15	337.55	0.00
13.000	329.85	51.14	80.42	337.90	0.00
14.000	330.00	52.03	73.80	338.40	0.00
15.000	330.15	52.56	69.44	338.87	0.00
16.000	330.29	53.16	65.29	339.33	0.00
0.000	330.36	53.36	64.01	339.52	0.00
17.000	330.46	53.57	62.74	339.83	0.00
18.000	330.60	53.79	61.06	340.17	0.00
19.000	330.77	54.05	60.21	340.61	0.00
20.000	331.07	54.24	59.31	340.97	0.00
21.000	331.27	54.04	59.56	341.40	.63
22.000	331.39	53.29	66.02	341.71	.63
23.000	331.54	52.94	68.90	342.03	.63
24.000	331.66	52.70	70.29	342.32	.63
25.000	331.83	52.90	70.93	342.66	.63
26.000	332.01	53.00	71.35	342.94	.63
27.000	332.17	53.04	71.62	343.19	.63
28.000	332.38	53.11	71.84	343.44	.63
29.000	330.19	52.90	72.09	34 .19	.63
30.000	329.50	52.66	72.28	341.07	.63
31.000	329.76	52.40	72.48	340.89	.63
32.000	328.97	52.22	72.74	339.79	.63
33.000	329.95	52.10	72.96	339.82	.63
34.000	330.05	52.03	73.01	339.10	.63
35.000	330.76	52.10	73.24	339.31	.63
36.000	331.29	52.07	73.17	339.61	.63
37.000	331.71	51.88	73.24	339.69	.63
38.000	327.40	51.80	73.22	338.25	.63
39.000	329.42	51.94	73.44	339.06	.63
40.000	331.02	51.95	73.51	339.42	.63
0.000	0.00	0.00	0.00	0.00	0.00
0.000	0.00	0.00	0.00	0.00	0.00
0.000	0.00	0.00	0.00	0.00	0.00
0.000	0.00	0.00	0.00	0.00	0.00

CYCLE NUMBER: 11 STARTED: 25 Aug 1987 1414 MDT

COOLER: 2 BASELINE DATA

MANFACTURER: CTI-7173

DESCRIPTION: HD-1033C

TEST DESCRIPTION: RELIABILITY LIFE TEST HIGH TEMP, .63W LOAD

ELAPSED TIME	CHAMBER TEMP (C)	POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	HEAT LOAD (W)
0.000	999.00	38.06	999.00	999.00	0.00
1.000	999.00	38.50	999.00	999.00	0.00
2.000	999.00	38.96	999.00	999.00	0.00
3.000	328.63	39.80	248.77	332.62	0.00
4.000	328.69	40.79	229.02	333.53	0.00
5.000	328.75	40.99	208.86	334.31	0.00
6.000	328.83	42.10	191.26	335.02	0.00
7.000	328.93	42.70	175.03	335.68	0.00
8.000	329.80	42.90	159.99	336.37	0.00
9.000	329.56	43.84	146.02	336.95	0.00
10.000	329.56	44.61	133.38	337.47	0.00
11.000	329.64	44.69	121.69	337.83	0.00
12.000	329.74	46.22	111.25	338.33	0.00
13.000	329.85	46.50	102.15	338.80	0.00
14.000	330.00	47.28	94.03	339.25	0.00
15.000	330.15	48.53	87.16	339.69	0.00
16.000	330.29	49.14	80.96	340.14	0.00
16.550	330.36	49.34	78.81	340.31	0.00
17.000	330.46	49.66	76.05	340.57	0.00
18.000	330.60	50.11	72.13	340.96	0.00
19.000	330.77	51.10	69.48	341.36	0.00
20.000	331.07	50.85	67.64	341.81	0.00
21.000	331.27	50.48	66.35	342.20	.63
22.000	331.39	49.98	71.88	342.54	.63
23.000	331.54	49.70	74.55	342.86	.63
24.000	331.68	49.25	76.28	343.17	.63
25.000	331.83	49.14	77.62	343.47	.63
26.000	332.01	49.05	78.62	343.73	.63
27.000	332.17	49.27	79.42	343.97	.63
28.000	332.38	49.06	80.04	344.21	.63
29.000	320.19	48.64	90.69	341.55	.63
30.000	325.50	48.99	81.08	342.22	.63
31.000	324.76	48.42	81.35	341.02	.63
32.000	326.57	48.32	81.65	341.54	.63
33.000	328.85	48.80	81.87	341.72	.63
34.000	330.05	48.80	82.08	341.89	.63
35.000	330.76	49.65	82.12	342.07	.63
36.000	331.29	48.73	82.43	342.25	.63
37.000	331.71	48.69	82.35	342.47	.63
38.000	327.40	48.50	82.31	341.72	.63
39.000	329.83	48.49	82.69	342.12	.63
40.000	331.02	48.96	82.69	342.34	.63
0.000	0.00	0.00	0.00	0.00	0.00
0.000	0.00	0.00	0.00	0.00	0.00
0.000	0.00	0.00	0.00	0.00	0.00
0.000	0.00	0.00	0.00	0.00	0.00

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 17
DATE: 14 January 1988

COOLER S/N: 7175
COOLER OPERATING TIME:
DATE OF FAILURE: 27 August 1987
CYCLE NUMBER: 22

INCIDENT/FAILURE:

Coldtip temperature above 90k during hours 29 thru 44 of cycle 22. Cooler is marginal and test dewar developed leaks. Cycle 22 was stopped to make dewar repair.

FAILURE CLASSIFICATION: **RELEVANT:** **NON RELEVANT:** X

REPAIR ACTION/ACTION TAKEN:

All bolts of the test dewar were retightened. Cooler performance returned to within the specification limits.

TEST ENGINEER:
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 18
DATE: 14 January 1988

COOLER S/N: 7173/7175
COOLER OPERATING TIME: _____
DATE OF FAILURE: 1 September 1987
CYCLE NUMBER: 23

INCIDENT/FAILURE:

Coldtip temperature above 90K cooler performance is marginal. Test dewars continue to develop leaks. Cycle 23 terminated to check leak.

FAILURE CLASSIFICATION: RELEVANT: _____ NOT RELEVANT: X

REPAIR ACTION/ACTION TAKEN:

Test dewar seals were retightened. Cooler performance returned to within the specification limit.

TEST ENGINEER: Henry Kleyn
PROJECT LEADER: _____
QUALITY ASSURANCE: _____

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 19
DATE: 14 January 1988

COOLER S/N: 7175
COOLER OPERATING TIME:
DATE OF FAILURE: 5 September 1987
CYCLE NUMBER: 24

INCIDENT/FAILURE:

Coldtip temperature above 90K during high temperature portion of cycle.

FAILURE CLASSIFICATION: RELEVANT: NON RELEVANT: X

REPAIR ACTION/ACTION TAKEN:

See Failure Report 14.

TEST ENGINEER:
PROJECT LEADER:
QUALITY ASSURANCE:

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 20
DATE: 14 January 1988

COOLER S/N: 7171/7173/7175
COOLER OPERATING TIME:
DATE OF FAILURE: 6 September 1987
CYCLE NUMBER: 25

INCIDENT/FAILURE:

Test program failed. Test chamber overheated.

FAILURE CLASSIFICATION: RELEVANT: _____ NON RELEVANT: X

REPAIR ACTION/ACTION TAKEN:

Test Program was corrected. Cooler seals replaced.

TEST ENGINEER: H. Gary K. Gray
PROJECT LEADER: [signature]
QUALITY ASSURANCE: [signature]

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 21
DATE: 14 January 1988

COOLER S/N: 7171
COOLER OPERATING TIME: _____
DATE OF FAILURE: 3 December 1987
CYCLE NUMBER: 27

INCIDENT/FAILURE:

Cooler number 1 (S/N 7171) coldfinger temperature exceeded 90K at hours 29 and 30.

FAILURE CLASSIFICATION: RELEVANT: _____ NON RELEVANT: X

REPAIR ACTION/ACTION TAKEN:

See Failure Report 14.

TEST ENGINEER: Henry Klipp
PROJECT LEADER: [signature]
QUALITY ASSURANCE: [signature]

ITEM INCIDENT/FAILURE REPORT

REPORT NUMBER: 22
DATE: 14 January 1988

COOLER S/N: 7173
COOLER OPERATING TIME:
DATE OF FAILURE: 14 December 1987
CYCLE NUMBER: 29

INCIDENT/FAILURE:

Cooler number 2 never cooled down.

FAILURE CLASSIFICATION: **RELEVANT:** X **NON RELEVANT:**

REPAIR ACTION/ACTION TAKEN:

TEST ENGINEER:
PROJECT LEADER:
QUALITY ASSURANCE:

APPENDIX D
RELIABILITY TEST PRINTOUT DATA

All data on the reliability test printout is self-explanatory except for the following:

For Cooler Parameters (except heat load cooldown time and chamber temperature)	– 999 indicates NO VALID DATA
For Heat Load	– 99 indicates NO VALID DATA
For Cooldown Time	– 9999 indicates NO VALID DATA – 8888 indicates COOLER DID NOT COOLDOWN DURING THE ALLOTTED 40 MINUTES – 7777 indicates COOLER WAS REMOVED FROM ACTIVE TESTING DUE TO TEMPERATURE OUT OF SPEC
For Chamber Temperature	– 726 indicates NO VALID DATA

It should also be noted for simplicity purposes, C^2NVEO decided to keep the heat load at a constant 0.90 Watt throughout the cycle. Thus, if a cooler did not meet the specification at high temperature, a baseline test was performed with the required 0.63 Watt heat load.

CYCLE NUMBER: 1 STARTED: 28 Jun 1987 16:14:00

ELAPSED TIME	CHAMBER TEMP (C)	#	POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	HEAT LOAD (W)
00:00	13.97	1	0.00	999.00	999.00	0.00
00:00	13.97	2	0.00	999.00	999.00	0.00
00:00	13.97	3	0.00	999.00	999.00	0.00
01:00	16.01	1	0.00	999.00	999.00	0.00
01:00	16.01	2	0.00	999.00	999.00	0.00
01:00	16.01	3	0.00	999.00	999.00	0.00
02:00	-4.20	1	0.00	999.00	999.00	0.00
02:00	-4.20	2	0.00	999.00	999.00	0.00
02:00	-4.20	3	0.00	999.00	999.00	0.00
03:00	-10.31	1	0.00	999.00	999.00	0.00
03:00	-10.31	2	0.00	999.00	999.00	0.00
03:00	-10.31	3	0.00	999.00	999.00	0.00
04:00	-32.19	1	0.00	999.00	999.00	0.00
04:00	-32.19	2	0.00	999.00	999.00	0.00
04:00	-32.19	3	0.00	999.00	999.00	0.00
05:00	-33.42	1	40.34	61.96	-24.42	.90
05:00	-33.42	2	38.32	59.84	-23.48	.90
05:00	-33.42	3	36.68	73.94	-21.75	.90
06:00	-8.00	1	42.01	65.73	-1.46	.90
06:00	-8.00	2	40.21	64.83	-.76	.90
06:00	-8.00	3	37.79	75.63	1.47	.90
07:00	10.33	1	45.19	69.78	17.97	.90
07:00	10.33	2	43.75	68.52	19.70	.90
07:00	10.33	3	40.78	77.46	20.94	.90
08:00	22.55	1	48.32	73.24	33.29	.90
08:00	22.55	2	46.38	72.36	34.05	.90
08:00	22.55	3	43.77	81.08	36.24	.90
09:00	22.45	1	47.91	73.17	33.63	.90
09:00	22.45	2	46.12	72.67	34.36	.90
09:00	22.45	3	43.33	80.96	36.51	.90
10:00	23.78	1	48.13	73.09	34.22	.90
10:00	23.78	2	45.95	72.63	34.85	.90
10:00	23.78	3	43.52	81.42	36.98	.90
11:00	23.36	1	48.21	73.09	33.81	.90
11:00	23.36	2	45.74	72.82	34.47	.90
11:00	23.36	3	43.72	81.81	36.66	.90

12:00	22.59	1	48.09	72.78	33.77	.90
12:00	22.59	2	45.51	72.86	34.36	.90
12:00	22.59	3	43.43	81.65	36.58	.90
13:00	22.97	1	48.28	72.67	33.91	.90
13:00	22.97	2	45.58	72.94	34.40	.90
13:00	22.97	3	43.49	82.54	36.61	.90
14:00	23.74	1	48.46	72.32	34.15	.90
14:00	23.74	2	45.51	72.94	34.61	.90
14:00	23.74	3	43.74	82.93	36.71	.90
15:00	23.57	1	48.41	71.85	34.08	.90
15:00	23.57	2	45.44	72.98	34.50	.90
15:00	23.57	3	43.96	82.77	36.75	.90
16:00	23 01	1	49.07	71.85	34.12	.90
16:00	23.01	2	45.24	72.59	34.40	.90
16:00	23.01	3	44.00	82.62	36.61	.90
17:00	22.59	1	48.91	71.66	34.12	.90
17:00	22.59	2	45.40	72.98	34.36	.90
17:00	22.59	3	44.06	82.35	36.54	.90
18:00	24.06	1	49.35	71.85	34.47	.90
18:00	24.06	2	45.29	73.13	34.71	.90
18:00	24.06	3	44.61	81.69	36.95	.90
19:00	23.85	1	49.83	71.81	35.36	.90
19:00	23.85	2	45.93	73.17	35.67	.90
19:00	23.85	3	45.18	80.46	37.52	.90
20:00	22.38	1	49.56	71.77	34.29	.90
20:00	22.38	2	45.82	72.44	34.57	.90
20:00	22.38	3	45.08	79.42	36.71	.90
21:00	23.18	1	49.43	71.81	34.54	.90
21:00	23.18	2	45.89	72.40	34.88	.90
21:00	23.18	3	45.17	79.00	37.08	.90
22:00	24.02	1	49.40	71.62	34.50	.90
22:00	24.02	2	46.10	72.09	34.99	.90
22:00	24.02	3	45.38	79.23	37.25	.90
23:00	21.89	1	49.42	71.62	34.12	.90
23:00	21.89	2	46.43	72.25	34.50	.90
23:00	21.89	3	44.98	79.08	36.58	.90
24:00	26.02	1	49.53	71.81	34.71	.90
24:00	26.02	2	46.33	72.44	35.09	.90
24:00	26.02	3	45.22	79.27	37.15	.90
25:00	23.01	1	0.00	999.00	999.00	0.00
25:00	23.01	2	0.00	999.00	999.00	0.00
25:00	23.01	3	0.00	999.00	999.00	0.00

26:00	21.36	1	0.00	999.00	999.00	0.00
26:00	21.36	2	0.00	999.00	999.00	0.00
26:00	21.36	3	0.00	999.00	999.00	0.00
27:00	26.38	1	0.00	999.00	999.00	0.00
27:00	26.38	2	0.00	999.00	999.00	0.00
27:00	26.38	3	0.00	999.00	999.00	0.00
28:00	29.70	1	0.00	999.00	999.00	0.00
28:00	29.70	2	0.00	999.00	999.00	0.00
28:00	29.70	3	0.00	999.00	999.00	0.00
29:00	999.00	1	999.00	999.00	999.00	99.00
29:00	999.00	2	999.00	999.00	999.00	99.00
29:00	999.00	3	999.00	999.00	999.00	99.00
30:35	29.70	1	999.00	999.00	999.00	99.00
30:35	29.70	2	999.00	999.00	999.00	99.00
30:35	29.70	3	999.00	999.00	999.00	99.00
31:30	26.91	1	47.57	72.36	38.30	.90
31:30	26.91	2	45.93	71.85	37.25	.90
31:30	26.91	3	43.76	81.54	39.72	.90
32:00	23.67	1	46.64	72.51	33.98	.90
32:00	23.67	2	45.55	70.89	33.22	.90
32:00	23.67	3	43.37	80.08	35.90	.90
33:00	22.66	1	46.50	72.82	33.56	.90
33:00	22.66	2	44.99	71.20	32.70	.90
33:00	22.66	3	43.23	80.19	35.46	.90
34:00	22.97	1	46.27	72.98	33.53	.90
34:00	22.97	2	44.87	71.20	32.70	.90
34:00	22.97	3	43.50	80.39	35.56	.90
35:00	22.66	1	46.37	72.98	33.32	.90
35:00	22.66	2	44.84	71.20	32.56	.90
35:00	22.66	3	43.35	80.00	35.20	.90
36:00	22.38	1	46.66	73.13	33.36	.99
36:00	22.38	2	44.65	71.27	32.42	.90
36:00	22.38	3	43.22	79.89	35.06	.90
37:00	23.01	1	46.69	73.36	33.49	.90
37:00	23.01	2	44.81	71.50	32.70	.90
37:00	23.01	3	43.23	79.77	35.46	.90
38:00	23.43	1	46.47	73.59	33.49	.90
38:00	23.43	2	44.83	71.77	32.80	.90
38:00	23 43	3	43.20	79.58	35.56	.90
39:00	23.71	1	46.62	73.21	33.56	.90
39:00	23.71	2	45.14	72.02	32.87	.90
39:00	23.71	3	43.04	80.73	35.63	.90

40:00	23.36	1	46.77	73.09	33.56	.90
40:00	23.36	2	45.30	71.77	32.77	.90
40:00	23.36	3	43.26	79.92	35.53	.90
41:00	23.04	1	47.07	73.28	33.63	.90
41:00	23.04	2	45.36	71.77	32.77	.90
41:00	23.04	3	43.51	80.04	35.50	.90
42:00	23.43	1	47.17	73.24	33.84	.90
42:00	23.43	2	45.29	71.90	32.97	.90
42:00	23.43	3	43.88	80.27	35.80	.90
43:00	22.73	1	47.24	73.32	33.63	.90
43:00	22.73	2	45.66	72.25	32.80	.90
43:00	22.73	3	43.86	80.19	35.53	.90
44:00	24.20	1	47.48	73.09	33.84	.90
44:00	24.20	2	45.40	72.32	33.11	.90
44:00	24.20	3	43.63	80.19	35.94	.90
45:00	23.36	1	47.53	73.01	33.70	.90
45:00	23.36	2	45.33	72.36	32.83	.90
45:00	23.36	3	43.97	79.16	35.63	.90
46:00	22.38	1	47.63	72.86	33.46	.90
46:00	22.38	2	45.67	72.17	32.56	.90
46:00	22.38	3	44.25	78.73	35.20	.90
47:00	22.62	1	47.76	72.78	33.74	.90
47:00	22.62	2	45.29	72.21	32.73	.90
47:00	22.62	3	44.19	78.66	35.53	.90
48:00	22.69	1	47.82	72.90	33.67	.90
48:00	22.69	2	45.58	72.21	32.73	.90
48:00	22.69	3	44.17	79.00	35.50	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 9
COOLER NUMBER: 2 COOLDOWN TIME: 9
COOLER NUMBER: 3 COOLDOWN TIME: 9

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: -9999
COOLER NUMBER: 2 COOLDOWN TIME: -9999
COOLER NUMBER: 3 COOLDOWN TIME: -9999

CYCLE NUMBER: 2 STARTED: 30 Jun 1987 16:14:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	22.66	1	0.00	999.00	999.00	0.00
00:15	22.66	2	0.00	999.00	999.00	0.00
00:15	22.66	3	0.00	999.00	999.00	0.00
01:00	22.97	1	0.00	999.00	999.00	0.00
01:00	22.97	2	0.00	999.00	999.00	0.00
01:00	22.97	3	0.00	999.00	999.00	0.00
02:00	-4.05	1	0.00	999.00	999.00	0.00
02:00	-4.05	2	0.00	999.00	999.00	0.00
02:00	-4.05	3	0.00	999.00	999.00	0.00
03:00	-31.66	1	0.00	999.00	999.00	0.00
03:00	-31.66	2	0.00	999.00	999.00	0.00
03:00	-31.66	3	0.00	999.00	999.00	0.00
04:00	-31.89	1	0.00	999.00	999.00	0.00
04:00	-31.89	2	0.00	999.00	999.00	0.00
04:00	-31.89	3	0.00	999.00	999.00	0.00
05:00	-33.61	1	41.19	61.63	-24.16	.90
05:00	-33.61	2	40.79	59.88	-24.08	.90
05:00	-33.61	3	36.45	77.27	-22.31	.90
06:00	-7.82	1	43.08	64.54	-1.42	.90
06:00	-7.82	2	42.85	63.19	-1.53	.90
06:00	-7.82	3	38.06	79.16	.66	.90
07:15	18.00	1	46.37	72.05	26.55	.90
07:15	18.00	2	45.64	70.05	26.25	.90
07:15	18.00	3	42.10	80.27	28.65	.90
08:00	23.39	1	46.98	73.55	33.22	.90
08:00	23.39	2	46.62	71.69	32.87	.90
08:00	23.39	3	43.57	82.08	35.60	.90
09:00	23.92	1	47.44	73.55	33.67	.90
09:00	23.92	2	46.15	71.62	33.04	.90
09:00	23.92	3	43.58	81.46	35.77	.90
10:00	23.57	1	47.23	73.63	33.70	.90
10:00	23.57	2	46.09	71.77	33.01	.90
10:00	23.57	3	43.39	81.46	35.67	.90
11:00	23.15	1	47.33	73.63	33.74	.90
11:00	23.15	2	46.01	71.98	32.90	.90
11:00	23.15	3	43.70	81.50	35.63	.90

12:00	22.34	1	47.62	73.44	33.56	.90
12:00	22.34	2	45.80	71.98	32.63	.90
12:00	22.34	3	43.64	81.58	35.36	.90
13:00	23.60	1	47.92	72.86	33.81	.90
13:00	23.60	2	45.50	72.32	32.94	.90
13:00	23.60	3	43.85	81.15	35.73	.90
14:00	23.08	1	47.71	73.13	33.84	.90
14:00	23.08	2	45.58	72.74	32.87	.90
14:00	23.08	3	43.86	81.19	35.67	.90
15:00	23.36	1	47.81	72.94	33.74	.90
15:00	23.36	2	45.41	72.74	32.73	.90
15:00	23.36	3	43.97	81.04	35.63	.90
16:00	23.57	1	48.13	73.01	33.81	.90
16:00	23.57	2	45.47	72.78	32.90	.90
16:00	23.57	3	44.12	80.73	35.77	.90
17:00	22.48	1	47.95	72.94	33.63	.90
17:00	22.48	2	45.30	72.98	32.56	.90
17:00	22.48	3	44.38	80.50	35.46	.90
18:00	23.04	1	47.74	73.21	33.84	.90
18:00	23.04	2	45.33	73.01	32.87	.90
18:00	23.04	3	44.40	80.12	35.77	.90
19:00	23.78	1	47.86	73.51	33.88	.90
19:00	23.78	2	45.42	72.98	33.04	.90
19:00	23.78	3	44.44	79.92	35.94	.90
20:00	22.41	1	48.09	73.32	33.63	.90
20:00	22.41	2	45.49	72.71	32.52	.90
20:00	22.41	3	44.28	79.69	35.36	.90
21:00	23.04	1	48.27	72.78	33.67	.90
21:00	23.04	2	45.54	72.59	32.70	.90
21:00	23.04	3	44.51	79.35	35.56	.90
22:00	23.11	1	47.77	73.17	33.67	.90
22:00	23.11	2	45.42	72.51	32.83	.90
22:00	23.11	3	44.45	79.00	35.67	.90
23:00	23.04	1	47.79	73.74	33.60	.90
23:00	23.04	2	45.27	72.55	32.80	.90
23:00	23.04	3	44.38	78.81	35.63	.90
24:00	23.11	1	47.99	73.09	33.81	.90
24:00	23.11	2	45.63	72.51	32.87	.90
24:00	23.11	3	44.41	78.96	35.70	.90
25:00	22.90	1	0.00	999.00	999.00	0.00
25:00	22.90	2	0.00	999.00	999.00	0.00
25:00	22.90	3	0.00	999.00	999.00	0.00

26:00	28.59	1	0.00	999.00	999.00	0.00
26:00	28.59	2	0.00	999.00	999.00	0.00
26:00	28.59	3	0.00	999.00	999.00	0.00
27:00	32.00	1	0.00	999.00	999.00	0.00
27:00	32.00	2	0.00	999.00	999.00	0.00
27:00	32.00	3	0.00	999.00	999.00	0.00
28:00	34.78	1	0.00	999.00	999.00	0.00
28:00	34.78	2	0.00	999.00	999.00	0.00
28:00	34.78	3	0.00	999.00	999.00	0.00
29:00	44.79	1	52.06	74.90	55.09	.92
29:00	44.79	2	50.95	75.13	54.65	.93
29:00	44.79	3	48.99	84.88	57.39	.92
30:00	56.75	1	56.22	76.93	69.11	.90
30:00	56.75	2	53.02	79.00	67.98	.90
30:00	56.75	3	50.17	89.77	70.73	.90
31:00	40.56	1	50.99	75.66	54.42	.90
31:00	40.56	2	49.63	76.47	53.34	.90
31:00	40.56	3	46.88	86.07	55.74	.90
32:00	28.75	1	48.30	74.59	40.70	.90
32:00	28.75	2	46.85	73.59	39.75	.90
32:00	28.75	3	44.96	82.46	42.25	.90
33:00	23.08	1	47.73	73.21	33.95	.90
33:00	23.08	2	45.29	72.36	33.01	.90
33:00	23.08	3	43.97	80.16	35.80	.90
34:00	24.23	1	47.19	74.01	33.81	.90
34:00	24.23	2	45.05	72.17	33.08	.90
34:00	24.23	3	43.60	80.16	35.94	.90
35:00	22.69	1	47.53	74.36	33.46	.90
35:00	22.69	2	44.83	72.21	32.45	.90
35:00	22.69	3	43.82	80.04	35.20	.90
36:00	23.78	1	47.30	74.40	33.67	.90
36:00	23.78	2	44.70	72.40	32.80	.90
36:00	23.78	3	43.75	80.23	35.73	.90
37:00	22.69	1	47.78	74.40	33.60	.90
37:00	22.69	2	44.71	72.28	32.49	.90
37:00	22.69	3	43.84	80.12	35.39	.90
38:00	22.34	1	48.11	74.20	33.53	.90
38:00	22.34	2	44.64	72.36	32.28	.90
38:00	22.34	3	43.98	79.42	35.06	.90
39:00	22.34	1	48.36	73.82	33.53	.90
39:00	22.34	2	44.65	72.28	32.31	.90
39:00	22.34	3	43.90	79.73	35.13	.90

40:00	23.67	1	48.04	74.01	33.77	.90
40:00	23.67	2	44.50	72.25	32.80	.90
40:00	23.67	3	44.14	79.42	35.73	.90
41:00	22.87	1	48.11	74.20	33.95	.90
41:00	22.87	2	44.66	72.36	32.77	.90
41:00	22.87	3	44.01	79.73	35.63	.90
42:00	22.76	1	47.81	74.17	33.77	.90
42:00	22.76	2	44.67	72.48	32.63	.90
42:00	22.76	3	44.03	79.81	35.53	.90
43:00	22.62	1	47.72	74.20	33.60	.90
43:00	22.62	2	44.86	72.67	32.49	.90
43:00	22.62	3	43.86	79.81	35.36	.90
44:00	22.34	1	47.96	74.09	33.53	.90
44:00	22.34	2	44.94	72.17	32.45	.90
44:00	22.34	3	44.01	79.77	35.16	.90
45:00	22.55	1	47.85	74.28	33.63	.90
45:00	22.55	2	44.84	72.05	32.63	.90
45:00	22.55	3	43.94	80.08	35.43	.90
46:00	23.60	1	47.89	74.40	33.77	.90
46:00	23.60	2	44.91	71.88	32.83	.90
46:00	23.60	3	43.86	79.89	35.67	.90
47:00	23.74	1	48.05	74.47	33.91	.90
47:00	23.74	2	44.75	72.36	32.90	.90
47:00	23.74	3	44.10	79.89	35.77	.90
48:00	22.83	1	48.09	74.20	33.81	.90
48:00	22.83	2	44.61	72.74	32.56	.90
48:00	22.83	3	43.86	79.23	35.50	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 9
COOLER NUMBER: 2 COOLDOWN TIME: 9
COOLER NUMBER: 3 COOLDOWN TIME: 10

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 12
COOLER NUMBER: 3 COOLDOWN TIME: 13

CYCLE NUMBER: 3 STARTED: 7 Jul 1987 10:08:00

ELAPSED TIME	CHAMBER TEMP (C)	#	POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	HEAT LOAD (W)
00:00	27.34	1	0.00	999.00	999.00	0.00
00:00	27.34	2	0.00	999.00	999.00	0.00
00:00	27.34	3	0.00	999.00	999.00	0.00
01:00	23.11	1	0.00	999.00	999.00	0.00
01:00	23.11	2	0.00	999.00	999.00	0.00
01:00	23.11	3	0.00	999.00	999.00	0.00
02:00	-4.35	1	0.00	999.00	999.00	0.00
02:00	-4.35	2	0.00	999.00	999.00	0.00
02:00	-4.35	3	0.00	999.00	999.00	0.00
03:00	-31.55	1	0.00	999.00	999.00	0.00
03:00	-31.55	2	0.00	999.00	999.00	0.00
03:00	-31.55	3	0.00	999.00	999.00	0.00
04:00	-32.15	1	0.00	999.00	999.00	0.00
04:00	-32.15	2	0.00	999.00	999.00	0.00
04:00	-32.15	3	0.00	999.00	999.00	0.00
05:00	-32.82	1	41.82	61.43	-24.23	.90
05:00	-32.82	2	38.95	60.45	-24.72	.90
05:00	-32.82	3	38.70	59.43	-22.54	.90
06:00	-5.41	1	44.17	64.83	1.29	.90
06:00	-5.41	2	41.43	64.75	1.14	.90
06:00	-5.41	3	40.85	63.02	3.66	.90
07:00	25.08	1	48.70	72.21	32.38	.90
07:00	25.08	2	45.64	73.24	32.38	.90
07:00	25.08	3	44.58	73.13	34.95	.90
08:00	23.43	1	48.41	73.47	35.09	.90
08:00	23.43	2	45.67	73.21	34.36	.90
08:00	23.43	3	44.79	75.51	36.61	.90
09:00	22.62	1	48.47	73.13	34.50	.90
09:00	22.62	2	45.41	72.82	33.77	.90
09:00	22.62	3	44.56	76.09	36.10	.90
10:00	23.60	1	48.08	73.78	34.85	.90
10:00	23.60	2	45.17	72.82	34.08	.90
10:00	23.60	3	44.53	76.01	36.44	.90
11:00	25.04	1	48.04	73.86	34.88	.90
11:00	25.04	2	44.89	72.90	34.50	.90
11:00	25.04	3	44.60	75.62	36.88	.90

12:00	24.45	1	48.07	74.01	35.46	.90
12:00	24.45	2	45.01	73.21	34.61	.90
12:00	24.45	3	44.65	76.01	37.08	.90
13:00	25.32	1	48.05	73.74	34.74	.90
13:00	25.32	2	44.76	72.82	34.36	.90
13:00	25.32	3	44.63	75.55	36.78	.90
14:00	22.62	1	48.14	73.78	34.29	.90
14:00	22.62	2	44.65	72.40	33.53	.90
14:00	22.62	3	44.60	75.66	35.94	.90
15:00	24.90	1	48.81	73.55	36.00	.90
15:00	24.90	2	44.78	72.59	34.92	.90
15:00	24.90	3	44.89	75.47	37.49	.90
16:00	27.89	1	48.60	73.55	36.07	.90
16:00	27.89	2	44.58	72.40	35.43	.90
16:00	27.89	3	44.94	75.16	38.00	.90
17:00	25.18	1	48.76	73.70	35.97	.90
17:00	25.18	2	44.61	72.90	34.99	.90
17:00	25.18	3	44.93	75.24	37.59	.90
18:00	23.92	1	48.55	73.59	35.16	.90
18:00	23.92	2	44.55	72.59	34.22	.90
18:00	23.92	3	45.05	74.74	36.81	.90
19:00	23.46	1	48.83	73.32	34.88	.90
19:00	23.46	2	44.38	72.59	33.84	.90
19:00	23.46	3	44.49	75.01	36.34	.90
20:00	27.76	1	48.99	73.32	35.94	.90
20:00	27.76	2	44.61	72.51	35.13	.90
20:00	27.76	3	44.95	74.47	37.79	.90
21:00	22.45	1	48.80	73.09	34.22	.90
21:00	22.45	2	44.29	72.71	33.29	.90
21:00	22.45	3	44.48	73.86	35.80	.90
22:00	22.45	1	49.17	73.21	34.36	.90
22:00	22.45	2	44.30	72.59	33.32	.90
22:00	22.45	3	44.74	73.97	35.80	.90
23:00	26.35	1	49.35	73.09	36.10	.90
23:00	26.35	2	44.41	73.01	35.09	.90
23:00	26.35	3	44.94	75.09	37.76	.90
24:00	26.32	1	49.73	72.78	36.14	.90
24:00	26.32	2	44.54	72.63	35.06	.90
24:00	26.32	3	44.66	74.66	37.69	.90
25:00	23.01	1	0.00	999.00	999.00	0.00
25:00	23.01	2	0.00	999.00	999.00	0.00
25:00	23.01	3	0.00	999.00	999.00	0.00

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 26:00    37.46    1    0.00  999.00  999.00   0.00
 26:00    37.46    2    0.00  999.00  999.00   0.00
 26:00    37.46    3    0.00  999.00  999.00   0.00

 27:00    51.78    1    0.00  999.00  999.00   0.00
 27:00    51.78    2    0.00  999.00  999.00   0.00
 27:00    51.78    3    0.00  999.00  999.00   0.00

 28:00    52.09    1    0.00  999.00  999.00   0.00
 28:00    52.09    2    0.00  999.00  999.00   0.00
 28:00    52.09    3    0.00  999.00  999.00   0.00

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COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER:  1  COOLDOWN TIME:  9
COOLER NUMBER:  2  COOLDOWN TIME:  9
COOLER NUMBER:  3  COOLDOWN TIME:  9

-------------------------------------------------------
COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER:  1  COOLDOWN TIME:  13
COOLER NUMBER:  2  COOLDOWN TIME:  13
COOLER NUMBER:  3  COOLDOWN TIME:  13
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CYCLE NUMBER: 3A STARTED: 2 Jul 1987 16:15:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	22.94	1	0.00	999.00	999.00	0.00
00:15	22.94	2	0.00	999.00	999.00	0.00
00:15	22.94	3	0.00	999.00	999.00	0.00
01:00	23.01	1	0.00	999.00	999.00	0.00
01:00	23.01	2	0.00	999.00	999.00	0.00
01:00	23.01	3	0.00	999.00	999.00	0.00
02:00	-4.31	1	0.00	999.00	999.00	0.00
02:00	-4.31	2	0.00	999.00	999.00	0.00
02:00	-4.31	3	0.00	999.00	999.00	0.00
03:00	-31.74	1	0.00	999.00	999.00	0.00
03:00	-31.74	2	0.00	999.00	999.00	0.00
03:00	-31.74	3	0.00	999.00	999.00	0.00
04:00	-32.19	1	0.00	999.00	999.00	0.00
04:00	-32.19	2	0.00	999.00	999.00	0.00
04:00	-32.19	3	0.00	999.00	999.00	0.00
05:00	-31.70	1	42.06	63.02	-23.14	.90
05:00	-31.70	2	40.69	60.74	-24.01	.90
05:00	-31.70	3	38.33	75.62	-21.94	.90
06:00	19.16	1	46.42	65.77	5.57	.90
06:00	19.16	2	42.42	66.35	6.83	.90
06:00	19.16	3	40.56	79.62	9.35	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 9
COOLER NUMBER: 2 COOLDOWN TIME: 9
COOLER NUMBER: 3 COOLDOWN TIME: 10

COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: -9999
COOLER NUMBER: 2 COOLDOWN TIME: -9999
COOLER NUMBER: 3 COOLDOWN TIME: -9999

CYCLE NUMBER: 4 STARTED: 10 Jul 1987 10:11:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:00	29.28	1	0.00	999.00	999.00	0.00
00:00	29.28	2	0.00	999.00	999.00	0.00
00:00	29.28	3	0.00	999.00	999.00	0.00
01:00	23.01	1	0.00	999.00	999.00	0.00
01:00	23.01	2	0.00	999.00	999.00	0.00
01:00	23.01	3	0.00	999.00	999.00	0.00
02:00	-4.46	1	0.00	999.00	999.00	0.00
02:00	-4.46	2	0.00	999.00	999.00	0.00
02:00	-4.46	3	0.00	999.00	999.00	0.00
03:00	-31.66	1	0.00	999.00	999.00	0.00
03:00	-31.66	2	0.00	999.00	999.00	0.00
03:00	-31.66	3	0.00	999.00	999.00	0.00
04:00	-31.74	1	0.00	999.00	999.00	0.00
04:00	-31.74	2	0.00	999.00	999.00	0.00
04:00	-31.74	3	0.00	999.00	999.00	0.00
05:00	-33.16	1	40.26	61.31	-24.79	.90
05:00	-33.16	2	38.71	60.37	-25.51	.90
05:00	-33.16	3	39.62	58.62	-22.09	.90
06:00	-7.02	1	42.37	63.39	-1.13	.90
06:00	-7.02	2	40.23	64.25	-1.42	.90
06:00	-7.02	3	40.29	61.39	1.91	.90
07:00	24.20	1	45.94	69.25	30.93	.90
07:00	24.20	2	44.50	70.36	30.68	.90
07:00	24.20	3	42.84	69.02	34.01	.90
08:00	24.83	1	46.01	70.36	34.19	.90
08:00	24.83	2	44.48	71.31	33.81	.90
08:00	24.83	3	42.97	70.24	37.02	.90
09:00	24.87	1	45.58	71.50	34.78	.90
09:00	24.87	2	44.23	71.73	34.01	.90
09:00	24.87	3	43.19	70.47	37.46	.90
10:00	23.99	1	45.40	71.88	34.33	.90
10:00	23.99	2	43.76	72.17	33.49	.90
10:00	23.99	3	43.06	70.78	36.98	.90
11:00	25.76	1	45.36	72.02	34.67	.90
11:00	25.76	2	43.58	72.28	33.95	.90
11:00	25.75	3	42.85	70.62	37.46	.90

12:00	26.68	1	45.56	72.21	34.99	.90
12:00	26.68	2	43.80	72.63	34.33	.90
12:00	26.68	3	42.75	70.58	37.83	.90
13:00	28.45	1	45.33	71.94	34.81	.90
13:00	28.45	2	43.62	72.51	34.47	.90
13:00	28.45	3	42.76	70.43	37.93	.90
14:00	28.39	1	45.33	72.05	34.81	.90
14:00	28.39	2	43.49	72.32	34.50	.90
14:00	28.39	3	42.98	70.24	37.90	.90
15:00	24.30	1	45.26	72.71	34.29	.90
15:00	24.30	2	43.66	72.44	33.46	.90
15:00	24.30	3	42.84	70.62	37.02	.90
16:00	27.17	1	45.91	71.46	34.99	.90
16:00	27.17	2	43.78	72.59	34.29	.90
16:00	27.17	3	43.14	70.55	37.79	.90
17:00	28.32	1	45.38	72.55	34.88	.90
17:00	28.32	2	43.36	72.82	34.50	.90
17:00	28.32	3	43.17	70.58	37.93	.90
18:00	22.90	1	45.18	72.90	33.36	.90
18:00	22.90	2	43.30	73.05	32.38	.90
18:00	22.90	3	42.82	70.85	36.00	.90
19:00	25.18	1	45.37	72.78	33.98	.90
19:00	25.18	2	43.80	72.82	33.46	.90
19:00	25.18	3	42.99	71.31	36.92	.90
20:00	23.43	1	45.31	73.09	33.81	.90
20:00	23.43	2	43.38	73.17	32.97	.90
20:00	23.43	3	42.89	71.85	36.44	.90
21:00	25.76	1	45.58	73.17	34.92	.90
21:00	25.76	2	43.69	73.24	34.15	.90
21:00	25.76	3	43.13	71.90	37.73	.90
22:00	26.35	1	45.56	73.21	34.74	.90
22:00	26.35	2	43.51	72.94	34.05	.90
22:00	26.35	3	43.24	71.62	37.62	.90
23:00	28.12	1	45.43	73.55	35.02	.90
23:00	28.12	2	43.91	72.86	34.57	.90
23:00	28.12	3	43.16	71.81	38.10	.90
24:00	23.15	1	45.20	73.59	33.46	.90
24:00	23.15	2	43.55	72.71	32.49	.90
24:00	23.15	3	42.84	72.17	36.07	.90
25:00	22.94	1	0.00	999.00	999.00	0.00
25:00	22.94	2	0.00	999.00	999.00	0.00
25:00	22.94	3	0.00	999.00	999.00	0.00

26:00	37.32	1	0.00	999.00	999.00	0.00
26:00	37.32	2	0.00	999.00	999.00	0.00
26:00	37.32	3	0.00	999.00	999.00	0.00
27:00	51.78	1	0.00	999.00	999.00	0.00
27:00	51.78	2	0.00	999.00	999.00	0.00
27:00	51.78	3	0.00	999.00	999.00	0.00
28:00	52.15	1	0.00	999.00	999.00	0.00
28:00	52.15	2	0.00	999.00	999.00	0.00
28:00	52.15	3	0.00	999.00	999.00	0.00
29:00	61.38	1	50.28	85.88	72.58	.90
29:00	61.38	2	49.16	80.16	71.53	.90
29:00	61.38	3	46.81	82.20	999.00	.90
30:00	68.94	1	51.66	88.41	999.00	.90
30:00	68.94	2	50.24	83.00	999.00	.90
30:00	68.94	3	47.63	85.59	999.00	.90
31:00	48.81	1	47.58	86.57	61.58	.90
31:00	48.81	2	47.42	78.62	60.33	.90
31:00	48.81	3	44.70	82.16	63.39	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 9
COOLER NUMBER: 2 COOLDOWN TIME: 9
COOLER NUMBER: 3 COOLDOWN TIME: 9

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 13
COOLER NUMBER: 2 COOLDOWN TIME: 13
COOLER NUMBER: 3 COOLDOWN TIME: 13

CYCLE NUMBER: 5 STARTED: 13 Jul 1987 09:19:00

ELAPSED TIME	CHAMBER TEMP (C)	#	POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:00	24.06	1	0.00	999.00	999.00	0.00
00:00	24.06	2	0.00	999.00	999.00	0.00
00:00	24.06	3	0.00	999.00	999.00	0.00
01:00	23.11	1	0.00	999.00	999.00	0.00
01:00	23.11	2	0.00	999.00	999.00	0.00
01:00	23.11	3	0.00	999.00	999.00	0.00
02:00	-4.27	1	0.00	999.00	999.00	0.00
02:00	-4.27	2	0.00	999.00	999.00	0.00
02:00	-4.27	3	0.00	999.00	999.00	0.00
03:00	-31.10	1	0.00	999.00	999.00	0.00
03:00	-31.10	2	0.00	999.00	999.00	0.00
03:00	-31.10	3	0.00	999.00	999.00	0.00
04:00	-31.89	1	0.00	999.00	999.00	0.00
04:00	-31.89	2	0.00	999.00	999.00	0.00
04:00	-31.89	3	0.00	999.00	999.00	0.00
05:00	-32.07	1	40.37	62.20	-24.49	.90
05:00	-32.07	2	38.86	58.91	-25.17	.90
05:00	-32.07	3	38.35	59.39	-21.83	.90
06:00	-8.33	1	41.74	64.54	-2.52	.90
06:00	-8.33	2	40.53	63.72	-2.74	.90
06:00	-8.33	3	39.21	61.92	.52	.90
07:00	23.95	1	45.27	69.55	31.06	.90
07:00	23.95	2	44.46	71.16	30.96	.90
07:00	23.95	3	42.39	69.44	34.26	.90
08:00	26.84	1	45.63	71.01	34.95	.90
08:00	26.84	2	44.74	72.40	34.47	.90
08:00	26.84	3	42.75	70.93	37.93	.90
09:00	22.97	1	45.48	71.12	33.42	.90
09:00	22.97	2	43.96	73.36	32.56	.90
09:00	22.97	3	42.75	71.08	36.21	.90
10:00	23.04	1	45.51	71.43	33.42	.90
10:00	23.04	2	43.79	73.70	32.59	.90
10:00	23.04	3	42.56	71.16	36.21	.90
11:00	24.34	1	45.61	71.94	34.47	.90
11:00	24.34	2	43.74	74.01	33.60	.90
11:00	24.34	3	42.73	71.43	37.29	.90

12:00	25.72	1	45.48	72.98	34.85	.90
12:00	25.72	2	43.80	74.09	34.08	.90
12:00	25.72	3	42.99	71.12	37.76	.90
13:00	27.27	1	45.51	73.09	34.99	.90
13:00	27.27	2	43.82	73.97	34.43	.90
13:00	27.27	3	43.19	71.16	38.10	.90
14:00	25.18	1	45.48	73.09	34.74	.90
14:00	25.18	2	43.82	73.70	33.98	.90
14:00	25.18	3	42.94	71.39	37.69	.90
15:00	25.82	1	45.42	73.40	34.95	.90
15:00	25.82	2	44.18	73.28	34.26	.90
15:00	25.82	3	42.99	71.90	37.86	.90
16:00	28.32	1	45.34	73.24	34.71	.90
16:00	28.32	2	43.79	73.01	34.47	.90
16:00	28.32	3	42.92	71.85	37.96	.90
17:00	23.78	1	45.31	73.51	33.91	.90
17:00	23.78	2	43.81	73.21	33.08	.90
17:00	23.78	3	42.75	72.17	36.78	.90
18:00	24.97	1	45.49	73.40	34.61	.90
18:00	24.97	2	43.89	72.98	33.88	.90
18:00	24.97	3	42.90	72.44	37.59	.90
19:00	25.18	1	45.33	73.24	33.81	.90
19:00	25.18	2	43.89	73.05	33.49	.90
19:00	25.18	3	42.93	72.51	36.98	.90
20:00	23.81	1	45.36	73.44	33.98	.90
20:00	23.81	2	43.82	72.94	33.15	.90
20:00	23.81	3	43.12	72.55	36.92	.90
21:00	26.15	1	45.40	73.44	34.81	.90
21:00	26.15	2	43.76	72.86	34.19	.90
21:00	26.15	3	43.13	72.21	37.93	.90
22:00	26.55	1	45.40	73.28	34.88	.90
22:00	26.55	2	43.96	72.78	34.33	.90
22:00	26.55	3	43.20	72.02	37.96	.90
23:15	24.23	1	45.34	73.44	34.78	.90
23:15	24.23	2	43.82	72.86	34.01	.90
23:15	24.23	3	43.03	72.32	37.85	.90
24:00	23.15	1	45.49	73.74	35.53	.90
24:00	23.15	2	43.87	73.17	34.43	.90
24:00	23.15	3	43.31	72.67	38.40	.90
25:00	23.15	1	0.00	999.00	999.00	0.00
25:00	23.15	2	0.00	999.00	999.00	0.00
25:00	23.15	3	0.00	999.00	999.00	0.00

26:00	37.35	1	0.00	999.00	999.00	0.00
26:00	37.35	2	0.00	999.00	999.00	0.00
26:00	37.35	3	0.00	999.00	999.00	0.00
27:00	51.99	1	0.00	999.00	999.00	0.00
27:00	51.99	2	0.00	999.00	999.00	0.00
27:00	51.99	3	0.00	999.00	999.00	0.00
28:00	52.36	1	0.00	999.00	999.00	0.00
28:00	52.36	2	0.00	999.00	999.00	0.00
28:00	52.36	3	0.00	999.00	999.00	0.00
29:00	65.31	1	51.45	83.00	726.00	.90
29:00	65.31	2	50.89	82.00	726.00	.90
29:00	65.31	3	47.49	84.19	726.00	.90
30:00	37.49	1	46.59	79.81	51.01	.90
30:00	37.49	2	45.27	77.58	49.15	.90
30:00	37.49	3	43.28	77.85	50.46	.90
31:00	29.67	1	45.72	79.39	42.66	.90
31:00	29.67	2	44.45	75.20	41.68	.90
31:00	29.67	3	42.64	76.20	44.82	.90
32:00	23.53	1	45.19	77.77	36.54	.90
32:00	23.53	2	43.71	73.90	35.77	.90
32:00	23.53	3	42.07	75.43	39.08	.90
33:00	36.21	1	44.95	79.12	37.22	.90
33:00	36.21	2	44.13	73.51	37.12	.90
33:00	36.21	3	42.16	75.86	40.23	.90
34:00	30.02	1	45.01	79.42	37.22	.90
34:00	30.02	2	44.23	73.67	36.95	.90
34:00	30.02	3	42.34	76.51	40.19	.90
35:00	23.32	1	44.99	79.50	36.34	.90
35:00	23.32	2	44.00	73.86	35.63	.90
35:00	23.32	3	42.15	76.85	38.98	.90
36:00	25.01	1	44.98	79.81	37.32	.90
36:00	25.01	2	43.94	74.09	36.61	.90
36:00	25.01	3	42.25	76.79	40.02	.90
37:15	30.02	1	44.97	79.69	37.39	.90
37:15	30.02	2	44.21	74.09	37.15	.90
37:15	30.02	3	42.32	76.16	40.40	.90
38:00	26.74	1	44.95	80.04	37.49	.90
38:00	26.74	2	43.97	74.23	37.02	.90
38:00	26.74	3	42.64	76.09	40.36	.90
39:00	25.79	1	44.95	79.81	37.08	.90
39:00	25.79	2	43.57	74.01	36.48	.90
39:00	25.79	3	42.94	76.05	39.89	.90

40:00	30.26	1	44.76	79.66	36.98	.90
40:00	30.26	2	43.57	73.86	36.71	.90
40:00	30.26	3	42.80	74.70	40.06	.90
41:00	22.80	1	44.64	79.77	35.43	.90
41:00	22.80	2	43.29	73.86	34.50	.90
41:00	22.80	3	42.49	74.70	38.13	.90
42:00	31.17	1	44.76	79.66	36.10	.90
42:00	31.17	2	43.43	74.01	35.83	.90
42:00	31.17	3	42.66	74.74	39.15	.90
43:00	35.94	1	44.97	79.73	36.95	.90
43:00	35.94	2	43.51	73.86	36.81	.90
43:00	35.94	3	42.60	75.16	40.13	.90
44:00	30.20	1	44.99	79.58	37.29	.90
44:00	30.20	2	43.31	74.01	36.95	.90
44:00	30.20	3	42.77	75.28	40.40	.90
45:00	30.06	1	45.08	79.50	37.25	.90
45:00	30.06	2	43.51	74.17	36.88	.90
45:00	30.06	3	42.99	75.47	40.33	.90
46:00	30.13	1	44.98	79.50	37.15	.90
46:00	30.13	2	43.54	74.32	36.78	.90
46:00	30.13	3	42.72	75.59	40.19	.90
47:00	24.62	1	45.30	78.04	36.95	.90
47:00	24.62	2	43.40	74.24	36.17	.90
47:00	24.62	3	42.77	75.62	39.65	.90
48:00	25.04	1	45.08	79.39	37.32	.90
48:00	25.04	2	43.32	74.63	36.54	.90
48:00	25.04	3	42.82	75.78	40.09	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 8
COOLER NUMBER: 3 COOLDOWN TIME: 9

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 13
COOLER NUMBER: 2 COOLDOWN TIME: 13
COOLER NUMBER: 3 COOLDOWN TIME: 13

CYCLE NUMBER: 6 STARTED: 15 Jul 1987 09:19:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	23.08	1	0.00	999.00	999.00	0.00
00:15	23.08	2	0.00	999.00	999.00	0.00
00:15	23.08	3	0.00	999.00	999.00	0.00
01:00	22.76	1	0.00	999.00	999.00	0.00
01:00	22.76	2	0.00	999.00	999.00	0.00
01:00	22.76	3	0.00	999.00	999.00	0.00
02:00	-.65	1	0.00	999.00	999.00	0.00
02:00	-.65	2	0.00	999.00	999.00	0.00
02:00	-.65	3	0.00	999.00	999.00	0.00
03:00	-31.47	1	0.00	999.00	999.00	0.00
03:00	-31.47	2	0.00	999.00	999.00	0.00
03:00	-31.47	3	0.00	999.00	999.00	0.00
04:00	-32.82	1	0.00	999.00	999.00	0.00
04:00	-32.82	2	0.00	999.00	999.00	0.00
04:00	-32.82	3	0.00	999.00	999.00	0.00
05:00	-14.13	1	999.00	999.00	999.00	99.00
05:00	-14.13	2	999.00	999.00	999.00	99.00
05:00	-14.13	3	999.00	999.00	999.00	99.00
06:00	-6.51	1	41.84	65.94	-15.94	.90
06:00	-6.51	2	40.83	64.46	-.76	.90
06:00	-6.51	3	39.95	64.66	3.00	.90
07:00	24.13	1	45.03	70.93	12.57	.90
07:00	24.13	2	43.85	72.09	30.09	.90
07:00	24.13	3	42.45	69.48	34.12	.90
08:00	24.62	1	45.42	73.05	14.64	.90
08:00	24.62	2	44.43	73.32	35.63	.90
08:00	24.62	3	43.62	71.20	40.06	.90
09:00	23.78	1	45.21	74.20	13.97	.90
09:00	23.78	2	44.47	73.74	35.06	.90
09:00	23.78	3	43.78	71.77	39.69	.90
10:00	25.72	1	45.31	75.09	15.06	.90
10:00	25.72	2	43.90	74.09	35.87	.90
10:00	25.72	3	44.04	72.40	40.40	.90
11:15	33.77	1	45.10	75.39	18.25	.90
11:15	33.77	2	43.66	74.09	36.51	.90
11:15	33.77	3	44.26	72.59	40.77	.90

12:00	24.83	1	45.24	75.28	14.57	.90
12:00	24.83	2	43.59	74.13	35.46	.90
12:00	24.83	3	44.17	72.44	40.06	.90
13:00	34.01	1	45.17	75.20	18.42	.90
13:00	34.01	2	43.35	74.05	36.48	.90
13:00	34.01	3	43.96	72.32	40.77	.90
14:00	22.97	1	45.12	74.93	12.85	.90
14:00	22.97	2	43.25	74.13	33.89	.90
14:00	22.97	3	43.81	72.40	38.74	.90
15:00	23.71	1	45.16	75.13	13.52	.90
15:00	23.71	2	43.49	74.09	34.57	.90
15:00	23.71	3	44.06	71.73	39.45	.90
16:00	22.76	1	45.09	75.16	12.78	.90
16:00	22.76	2	43.23	73.86	33.91	.90
16:00	22.76	3	44.01	71.62	38.71	.90
17:00	28.42	1	45.39	75.09	17.02	.90
17:00	28.42	2	43.39	73.82	36.31	.90
17:00	28.42	3	44.29	71.94	40.77	.90
18:00	26.15	1	45.25	75.24	15.37	.90
18:00	26.15	2	43.66	73.90	35.94	.90
18:00	26.15	3	44.13	72.21	40.50	.90
19:00	25.08	1	45.23	75.20	14.71	.90
19:00	25.08	2	43.89	73.90	35.70	.90
19:00	25.08	3	44.06	71.90	40.23	.90
20:00	25.15	1	45.27	74.63	14.74	.90
20:00	25.15	2	43.85	73.82	35.77	.90
20:00	25.15	3	44.05	71.77	40.26	.90
21:00	24.94	1	45.34	74.66	14.53	.90
21:00	24.94	2	43.51	73.67	35.53	.90
21:00	24.94	3	43.96	71.73	40.16	.90
22:00	24.02	1	45.16	74.93	13.80	.90
22:00	24.02	2	43.45	73.28	34.81	.90
22:00	24.02	3	44.07	71.85	39.58	.90
23:00	26.68	1	45.64	74.55	15.87	.90
23:00	26.68	2	44.17	73.40	36.31	.90
23:00	26.68	3	44.22	71.54	40.83	.90
24:00	22.80	1	45.39	74.66	12.96	.90
24:00	22.80	2	43.49	73.36	34.22	.90
24:00	22.80	3	43.94	71.50	38.98	.90
25:00	23.43	1	0.00	999.00	999.00	0.00
25:00	23.43	2	0.00	999.00	999.00	0.00
25:00	23.43	3	0.00	999.00	999.00	0.00

26:00	37.52	1	0.00	999.00	999.00	0.00
26:00	37.52	2	0.00	999.00	999.00	0.00
26:00	37.52	3	0.00	999.00	999.00	0.00
27:00	51.38	1	0.00	999.00	999.00	0.00
27:00	51.38	2	0.00	999.00	999.00	0.00
27:00	51.38	3	0.00	999.00	999.00	0.00
28:00	52.64	1	0.00	999.00	999.00	0.00
28:00	52.64	2	0.00	999.00	999.00	0.00
28:00	52.64	3	0.00	999.00	999.00	0.00
29:00	60.06	1	49.41	91.53	45.60	.90
29:00	60.06	2	50.28	80.04	69.20	.90
29:00	60.06	3	47.28	82.81	73.67	.90
30:00	51.97	1	48.59	93.84	40.60	.90
30:00	51.97	2	48.88	80.42	65.48	.90
30:00	51.97	3	46.58	84.54	70.25	.90
31:00	33.84	1	45.06	91.86	23.22	.90
31:00	33.84	2	45.11	76.20	45.26	.90
31:00	33.84	3	43.32	82.12	49.92	.90
32:00	24.73	1	43.61	90.57	14.29	.90
32:00	24.73	2	43.39	73.47	33.91	.90
32:00	24.73	3	41.66	79.77	38.47	.90
33:00	23.15	1	43.37	90.76	12.96	.90
33:00	23.15	2	43.13	73.36	32.97	.90
33:00	23.15	3	41.79	79.08	37.59	.90
34:00	23.01	1	43.25	91.09	13.06	.90
34:00	23.01	2	42.83	73.40	33.01	.90
34:00	23.01	3	41.78	79.00	37.73	.90
35:00	25.29	1	43.39	91.31	14.60	.90
35:00	25.29	2	42.88	73.36	33.81	.90
35:00	25.29	3	41.93	79.31	38.44	.90
36:00	23.67	1	43.22	91.60	13.41	.90
36:00	23.67	2	42.85	73.21	33.22	.90
36:00	23.67	3	41.91	79.27	37.96	.90
37:00	25.18	1	43.39	89.73	14.53	.90
37:00	25.18	2	42.92	73.21	33.67	.90
37:00	25.18	3	41.95	79.35	38.37	.90
38:00	25.32	1	43.37	90.32	14.57	.90
38:00	25.32	2	42.68	73.13	33.70	.90
38:00	25.32	3	41.92	79.58	38.37	.90

39:00	27.57	1	43.45	90.46	15.09	.90
39:00	27.57	2	42.57	73.28	34.01	.90
39:00	27.57	3	42.14	79.31	38.57	.90
40:15	27.37	1	43.37	90.76	14.95	.90
40:15	27.37	2	42.58	73.13	33.88	.90
40:15	27.37	3	42.17	79.46	38.50	.90
41:00	23.36	1	43.36	90.98	13.27	.90
41:00	23.36	2	42.53	73.13	33.08	.90
41:00	23.36	3	41.84	79.69	37.86	.90
42:00	25.66	1	43.38	91.57	14.57	.90
42:00	25.66	2	42.67	73.36	33.63	.90
42:00	25.66	3	42.06	79.66	38.27	.90
43:00	27.47	1	43.41	91.60	14.99	.90
43:00	27.47	2	42.80	73.32	33.95	.90
43:00	27.47	3	41.87	79.66	38.50	.90
44:00	28.16	1	43.41	91.38	13.97	.90
44:00	28.16	2	42.90	73.32	34.12	.90
44:00	28.16	3	42.08	78.66	38.50	.90
45:00	28.09	1	43.47	91.97	13.87	.90
45:00	28.09	2	43.16	73.24	34.12	.90
45:00	28.09	3	42.10	79.00	38.54	.90
46:00	28.16	1	43.50	92.37	13.94	.90
46:00	28.16	2	43.25	73.13	34.08	.90
46:00	28.16	3	42.25	79.08	38.40	.90
47:00	22.52	1	43.41	92.30	12.89	.90
47:00	22.52	2	43.02	73.28	32.63	.90
47:00	22.52	3	41.81	79.27	37.35	.90
48:00	23.57	1	43.38	92.04	13.45	.90
48:00	23.57	2	43.13	73.36	33.15	.90
48:00	23.57	3	41.93	79.31	37.86	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 9
COOLER NUMBER: 2 COOLDOWN TIME: 8
COOLER NUMBER: 3 COOLDOWN TIME: 9

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 13
COOLER NUMBER: 2 COOLDOWN TIME: 12
COOLER NUMBER: 3 COOLDOWN TIME: 13

CYCLE NUMBER: 7 STARTED: 22 Jul 1987 07:33:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	23.25	1	0.00	999.00	999.00	0.00
00:15	23.25	2	0.00	999.00	999.00	0.00
00:15	23.25	3	0.00	999.00	999.00	0.00
01:00	22.97	1	0.00	999.00	999.00	0.00
01:00	22.97	2	0.00	999.00	999.00	0.00
01:00	22.97	3	0.00	999.00	999.00	0.00
02:00	-4.46	1	0.00	999.00	999.00	0.00
02:00	-4.46	2	0.00	999.00	999.00	0.00
02:00	-4.46	3	0.00	999.00	999.00	0.00
03:00	-31.92	1	0.00	999.00	999.00	0.00
03:00	-31.92	2	0.00	999.00	999.00	0.00
03:00	-31.92	3	0.00	999.00	999.00	0.00
04:00	-32.71	1	0.00	999.00	999.00	0.00
04:00	-32.71	2	0.00	999.00	999.00	0.00
04:00	-32.71	3	0.00	999.00	999.00	0.00
05:00	-34.33	1	39.55	59.15	-37.33	.90
05:00	-34.33	2	39.03	57.89	-29.03	.90
05:00	-34.33	3	39.29	56.91	-25.66	.90
06:00	-8.22	1	41.00	64.87	-18.26	.90
06:00	-8.22	2	40.16	64.79	-1.53	.90
06:00	-8.22	3	39.00	63.19	2.35	.90
07:00	22.73	1	44.93	69.51	9.81	.90
07:00	22.73	2	43.81	71.50	29.05	.90
07:00	22.73	3	42.17	69.36	32.49	.90
08:00	27.14	1	45.85	71.27	12.57	.90
08:00	27.14	2	43.85	73.78	34.47	.90
08:00	27.14	3	42.93	71.69	38.47	.90
09:00	24.09	1	45.88	71.35	13.13	.90
09:00	24.09	2	43.47	73.97	34.05	.90
09:00	24.09	3	43.06	71.69	38.57	.90
10:00	27.20	1	45.83	71.62	14.15	.90
10:00	27.20	2	43.95	73.97	34.47	.90
10:00	27.20	3	43.29	71.85	38.77	.90
11:00	24.59	1	45.74	71.62	13.34	.90
11:00	24.59	2	43.41	73.90	34.15	.90
11:00	24.59	3	43.15	71.58	38.57	.90

12:00	25.72	1	45.72	71.58	13.76	.90
12:00	25.72	2	43.43	73.70	34.22	.90
12:00	25.72	3	43.14	71.54	38.60	.90
13:00	25.76	1	45.60	71.98	13.80	.90
13:00	25.76	2	43.72	73.78	34.33	.90
13:00	25.76	3	43.09	71.54	38.67	.90
14:00	27.43	1	45.49	72.82	14.25	.90
14:00	27.43	2	43.75	73.59	34.61	.90
14:00	27.43	3	43.03	71.69	38.84	.90
15:00	23.04	1	45.51	72.71	11.97	.90
15:00	23.04	2	43.03	73.59	33.36	.90
15:00	23.04	3	43.07	71.69	37.90	.90
16:00	22.76	1	45.48	72.17	11.69	.90
16:00	22.76	2	42.94	73.63	33.15	.90
16:00	22.76	3	42.91	71.50	37.69	.90
17:00	23.01	1	45.45	73.01	12.22	.90
17:00	23.01	2	43.09	73.74	33.56	.90
17:00	23.01	3	43.28	71.46	38.17	.90
18:00	23.64	1	45.53	72.90	12.53	.90
18:00	23.64	2	42.92	73.55	33.67	.90
18:00	23.64	3	43.03	71.58	38.20	.90
19:00	23.36	1	45.45	72.98	12.29	.90
19:00	23.36	2	42.94	73.59	33.60	.90
19:00	23.36	3	43.08	71.39	38.17	.90
20:00	23.74	1	45.36	73.09	12.57	.90
20:00	23.74	2	43.28	73.47	33.81	.90
20:00	23.74	3	43.22	71.69	38.30	.90
21:00	28.06	1	45.30	73.13	13.99	.90
21:00	28.06	2	42.99	73.40	34.40	.90
21:00	28.06	3	43.20	71.66	38.64	.90
22:00	24.69	1	45.46	73.17	13.38	.90
22:00	24.69	2	43.16	73.40	34.05	.90
22:00	24.69	3	43.09	71.69	38.50	.90
23:00	27.27	1	45.38	73.28	14.15	.90
23:00	27.27	2	43.24	73.40	34.33	.90
23:00	27.27	3	43.07	71.69	38.71	.90
24:00	27.14	1	45.29	73.47	14.08	.90
24:00	27.14	2	43.24	73.59	34.26	.90
24:00	27.14	3	42.96	71.90	38.64	.90
25:00	23.67	1	0.00	999.00	999.00	0.00
25:00	23.67	2	0.00	999.00	999.00	0.00
25:00	23.67	3	0.00	999.00	999.00	0.00

26:00	37.56	1	0.00	999.00	999.00	0.00
26:00	37.56	2	0.00	999.00	999.00	0.00
26:00	37.56	3	0.00	999.00	999.00	0.00
27:00	51.91	1	0.00	999.00	999.00	0.00
27:00	51.91	2	0.00	999.00	999.00	0.00
27:00	51.91	3	0.00	999.00	999.00	0.00
28:00	51.88	1	0.00	999.00	999.00	0.00
28:00	51.88	2	0.00	999.00	999.00	0.00
28:00	51.88	3	0.00	999.00	999.00	0.00
29:00	27.27	1	46.43	74.20	15.90	.90
29:00	27.27	2	44.14	74.82	38.44	.90
29:00	27.27	3	42.80	75.97	42.73	.90
30:30	33.11	1	46.66	75.39	20.49	.90
30:30	33.11	2	44.96	75.47	42.96	.90
30:30	33.11	3	43.58	76.66	47.09	.90
31:00	25.01	1	45.80	74.74	13.80	.90
31:00	25.01	2	43.61	74.28	36.00	.90
31:00	25.01	3	42.41	75.16	40.19	.90
32:00	24.76	1	45.52	74.32	13.38	.90
32:00	24.76	2	43.43	73.59	34.19	.90
32:00	24.76	3	42.36	74.36	38.44	.90
33:00	24.73	1	45.42	74.59	13.06	.90
33:00	24.73	2	43.14	73.24	34.01	.90
33:00	24.73	3	42.20	74.32	38.40	.90
34:00	23.08	1	45.46	74.17	11.62	.90
34:00	23.08	2	43.10	73.21	33.32	.90
34:00	23.08	3	42.06	74.40	37.69	.90
35:00	24.23	1	45.29	75.09	12.68	.90
35:00	24.23	2	43.09	73.28	33.84	.90
35:00	24.23	3	42.40	74.47	38.27	.90
36:00	23.46	1	45.27	74.43	11.97	.90
36:00	23.46	2	42.93	73.32	33.49	.90
36:00	23.46	3	42.22	74.36	37.96	.90
37:00	23.53	1	45.22	74.97	12.04	.90
37:00	23.53	2	42.85	73.17	33.63	.90
37:00	23.53	3	42.30	74.51	38.13	.90
38:00	23.18	1	44.89	76.12	11.69	.90
38:00	23.18	2	43.04	73.13	33.32	.90
38:00	23.18	3	42.23	74.28	37.73	.90
39:00	26.02	1	44.87	76.78	13.52	.90
39:00	26.02	2	43.06	73.13	34.19	.90
39:00	26.02	3	42.47	74.32	38.50	.90

40:00	24.80	1	45.13	75.86	13.06	.90
40:00	24.80	2	43.12	73.01	34.05	.90
40:00	24.80	3	42.39	74.40	38.47	.90
41:00	27.47	1	44.92	77.04	13.69	.90
41:00	27.47	2	42.99	73.09	34.22	.90
41:00	27.47	3	42.05	75.47	38.57	.90
42:00	23.78	1	44.74	77.31	12.22	.90
42:00	23.78	2	42.88	73.17	33.67	.90
42:00	23.78	3	42.14	74.63	38.03	.90
43:00	24.34	1	45.04	76.20	12.68	.90
43:00	24.34	2	43.13	73.17	33.98	.90
43:00	24.34	3	42.35	74.66	38.30	.90
44:00	23.18	1	44.66	77.62	11.66	.90
44:00	23.18	2	43.07	73.09	33.29	.90
44:00	23.18	3	42.24	74.63	37.69	.90
45:00	23.88	1	44.78	77.43	12.32	.90
45:00	23.88	2	43.12	73.24	33.77	.90
45:00	23.88	3	42.18	74.82	38.10	.90
46:00	27.14	1	45.09	75.43	12.36	.90
46:00	27.14	2	43.02	73.24	34.26	.90
46:00	27.14	3	42.11	75.05	38.30	.90
47:00	24.76	1	44.73	77.39	12.99	.90
47:00	24.76	2	43.04	73.32	33.91	.90
47:00	24.76	3	42.05	75.05	38.20	.90
48:00	22.76	1	44.63	77.16	11.24	.90
48:00	22.76	2	43.02	73.40	33.01	.90
48:00	22.76	3	41.99	75.28	37.42	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 8
COOLER NUMBER: 3 COOLDOWN TIME: 8

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 12
COOLER NUMBER: 3 COOLDOWN TIME: 13

CYCLE NUMBER: 8 STARTED: 24 Jul 1987 07:34:00

ELAPSED TIME	CHAMBER TEMP (C)	#	POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	22.94	1	0.00	999.00	999.00	0.00
00:15	22.94	2	0.00	999.00	999.00	0.00
00:15	22.94	3	0.00	999.00	999.00	0.00
01:00	22.90	1	0.00	999.00	999.00	0.00
01:00	22.90	2	0.00	999.00	999.00	0.00
01:00	22.90	3	0.00	999.00	999.00	0.00
02:00	-4.82	1	0.00	999.00	999.00	0.00
02:00	-4.82	2	0.00	999.00	999.00	0.00
02:00	-4.82	3	0.00	999.00	999.00	0.00
03:00	-31.85	1	0.00	999.00	999.00	0.00
03:00	-31.85	2	0.00	999.00	999.00	0.00
03:00	-31.85	3	0.00	999.00	999.00	0.00
04:00	-32.26	1	0.00	999.00	999.00	0.00
04:00	-32.26	2	0.00	999.00	999.00	0.00
04:00	-32.26	3	0.00	999.00	999.00	0.00
05:00	-59.78	1	41.06	57.93	-66.16	.90
05:00	-59.78	2	39.30	56.79	-41.68	.90
05:00	-59.78	3	40.68	56.54	-38.72	.90
06:00	-12.03	1	39.50	66.63	-22.28	.90
06:00	-12.03	2	39.29	64.29	-5.59	.90
06:00	-12.03	3	38.26	63.56	-2.94	.90
07:00	25.79	1	44.29	70.81	9.74	.90
07:00	25.79	2	43.13	71.62	29.44	.90
07:00	25.79	3	42.11	69.86	32.73	.90
08:00	26.58	1	45.34	72.13	12.61	.90
08:00	26.58	2	43.97	73.51	34.36	.90
08:00	26.58	3	42.55	72.63	38.33	.90
09:00	25.66	1	45.36	72.59	13.17	.90
09:00	25.66	2	43.98	73.78	34.15	.90
09:00	25.66	3	42.81	72.90	38.44	.90
10:00	23.64	1	45.26	72.86	12.08	.90
10:00	23.64	2	43.83	73.94	33.88	.90
10:00	23.64	3	42.97	72.98	38.20	.90
11:00	22.62	1	45.08	73.97	11.27	.90
11:00	22.62	2	44.01	73.82	33.32	.90
11:00	22.62	3	42.71	73.09	37.73	.90

12:00	25.95	1	45.04	74.32	13.45	.90
12:00	25.95	2	43.70	73.78	34.26	.90
12:00	25.95	3	42.82	73.28	38.57	.90
13:00	23.78	1	45.24	73.82	12.18	.90
13:00	23.78	2	43.38	73.90	33.81	.90
13:00	23.78	3	42.89	73.13	38.20	.90
14:00	27.24	1	45.13	74.17	12.39	.90
14:00	27.24	2	43.66	73.86	34.40	.90
14:00	27.24	3	42.85	73.32	38.47	.90
15:00	27.30	1	44.98	74.66	13.55	.90
15:00	27.30	2	43.76	73.97	34.36	.90
15:00	27.30	3	42.96	73.28	38.57	.90
16:00	27.43	1	45.03	74.32	12.57	.90
16:00	27.43	2	43.61	74.13	34.61	.90
16:00	27.43	3	42.96	73.09	38.71	.90
17:00	24.66	1	45.08	74.82	12.92	.90
17:00	24.66	2	43.98	74.17	34.01	.90
17:00	24.66	3	42.96	73.05	38.37	.90
18:00	24.59	1	44.92	75.09	12.85	.90
18:00	24.59	2	43.66	74.09	33.95	.90
18:00	24.59	3	43.00	73.24	38.33	.90
19:00	24.69	1	45.25	74.32	12.96	.90
19:00	24.69	2	43.27	74.24	33.91	.90
19:00	24.69	3	42.75	72.98	38.37	.90
20:00	23.46	1	45.14	74.59	11.90	.90
20:00	23.46	2	43.19	74.28	33.56	.90
20:00	23.46	3	43.01	72.94	38.10	.90
21:00	27.40	1	45.10	74.82	13.66	.90
21:00	27.40	2	43.53	74.13	34.25	.90
21:00	27.40	3	42.91	72.63	38.64	.90
22:00	23.36	1	45.05	74.93	11.80	.90
22:00	23.36	2	43.20	74.17	33.42	.90
22:00	23.36	3	42.79	73.05	37.96	.90
23:00	24.41	1	45.24	74.82	12.71	.90
23:00	24.41	2	43.44	74.13	33.88	.90
23:00	24.41	3	42.87	72.63	38.33	.90
24:00	27.07	1	45.01	74.90	13.41	.90
24:00	27.07	2	43.38	74.24	34.19	.90
24:00	27.07	3	42.96	72.98	38.57	.90
25:00	726.00	1	0.00	999.00	999.00	0.00
25:00	726.00	2	0.00	999.00	999.00	0.00
25:00	726.00	3	0.00	999.00	999.00	0.00

26:00	726.00	1	0.00	999.00	999.00	0.00
26:00	726.00	2	0.00	999.00	999.00	0.00
26:00	726.00	3	0.00	999.00	999.00	0.00
27:00	726.00	1	0.00	999.00	999.00	0.00
27:00	726.00	2	0.00	999.00	999.00	0.00
27:00	726.00	3	0.00	999.00	999.00	0.00
28:00	726.00	1	0.00	999.00	999.00	0.00
28:00	726.00	2	0.00	999.00	999.00	0.00
28:00	726.00	3	0.00	999.00	999.00	0.00
29:00	52.76	1	48.60	79.27	36.64	.90
29:00	52.76	2	46.55	78.20	61.45	.90
29:00	52.76	3	46.08	79.50	65.41	.90
30:00	37.96	1	47.40	77.66	25.79	.90
30:00	37.96	2	45.16	76.12	50.53	.90
30:00	37.96	3	44.40	79.20	55.09	.90
31:00	24.34	1	45.60	74.86	12.82	.90
31:00	24.34	2	43.71	72.78	35.36	.90
31:00	24.34	3	42.46	74.78	39.75	.90
32:00	23.08	1	45.23	74.28	11.66	.90
32:00	23.08	2	43.52	72.17	33.32	.90
32:00	23.08	3	42.13	74.20	37.79	.90
33:00	24.87	1	45.33	74.17	13.10	.90
33:00	24.87	2	43.66	72.21	34.12	.90
33:00	24.87	3	42.48	73.90	38.47	.90
34:00	23.11	1	45.17	74.66	11.62	.90
34:00	23.11	2	43.44	72.29	33.36	.90
34:00	23.11	3	42.32	74.01	37.76	.90
35:00	24.87	1	45.10	75.39	13.10	.90
35:00	24.87	2	43.55	72.28	34.12	.90
35:00	24.87	3	42.37	73.70	38.47	.90
36:00	22.80	1	44.81	75.82	11.31	.90
36:00	22.80	2	43.70	72.32	33.11	.90
36:00	22.80	3	42.35	73.74	37.59	.90
37:00	24.83	1	44.90	75.82	13.06	.90
37:00	24.83	2	44.26	72.28	34.22	.90
37:00	24.83	3	42.38	73.90	38.44	.90
38:00	25.79	1	44.96	75.55	13.34	.90
38:00	25.79	2	43.91	72.59	34.19	.90
38:00	25.79	3	42.43	73.78	38.50	.90
39:00	23.04	1	44.88	75.59	11.59	.90
39:00	23.04	2	43.71	72.63	33.36	.90
39:00	23.04	3	42.41	73.90	37.79	.90

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40:00    23.18    1    44.89    75.82    11.94    .90
40:00    23.18    2    43.65    72.63    33.50    .90
40:00    23.18    3    42.43    73.97    38.03    .90

41:00    27.43    1    44.78    75.51    13.69    .90
41:00    27.43    2    43.64    72.51    34.29    .90
41:00    27.43    3    42.79    73.74    38.57    .90

42:00    22.83    1    44.79    75.43    11.66    .90
42:00    22.83    2    43.81    72.55    33.36    .90
42:00    22.83    3    42.53    73.78    37.83    .90

43:00    23.18    1    44.76    75.32    11.69    .90
43:00    23.18    2    43.94    72.63    33.56    .90
43:00    23.18    3    42.54    74.01    37.93    .90

44:00    25.99    1    44.79    75.59    13.48    .90
44:00    25.99    2    44.47    72.55    34.29    .90
44:00    25.99    3    42.50    74.13    38.50    .90

45:00    27.40    1    44.80    75.55    12.61    .90
45:00    27.40    2    43.84    72.71    34.67    .90
45:00    27.40    3    42.55    74.09    38.77    .90

46:00    27.14    1    44.85    75.36    12.43    .90
46:00    27.14    2    44.50    72.59    34.61    .90
46:00    27.14    3    42.54    73.97    38.67    .90

47:00    23.74    1    44.88    75.24    12.22    .90
47:00    23.74    2    44.01    72.74    33.88    .90
47:00    23.74    3    42.62    73.51    38.20    .90

48:00    25.92    1    44.90    75.24    13.45    .90
48:00    25.92    2    44.02    72.67    34.29    .90
48:00    25.92    3    42.81    73.67    38.64    .90

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COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER:  1  COOLDOWN TIME:  8
COOLER NUMBER:  2  COOLDOWN TIME:  8
COOLER NUMBER:  3  COOLDOWN TIME:  9

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COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER:  1  COOLDOWN TIME:  10
COOLER NUMBER:  2  COOLDOWN TIME:  10
COOLER NUMBER:  3  COOLDOWN TIME:  10
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CYCLE NUMBER: 9 STARTED: 26 Jul 1987 07:35:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	999.00	1	0.00	999.00	999.00	0.00
00:15	999.00	2	0.00	999.00	999.00	0.00
00:15	999.00	3	0.00	999.00	999.00	0.00
01:00	999.00	1	0.00	999.00	999.00	0.00
01:00	999.00	2	0.00	999.00	999.00	0.00
01:00	999.00	3	0.00	999.00	999.00	0.00
02:00	999.00	1	0.00	999.00	999.00	0.00
02:00	999.00	2	0.00	999.00	999.00	0.00
02:00	999.00	3	0.00	999.00	999.00	0.00
03:00	999.00	1	0.00	999.00	999.00	0.00
03:00	999.00	2	0.00	999.00	999.00	0.00
03:00	999.00	3	0.00	999.00	999.00	0.00
04:00	999.00	1	0.00	999.00	999.00	0.00
04:00	999.00	2	0.00	999.00	999.00	0.00
04:00	999.00	3	0.00	999.00	999.00	0.00
05:00	-32.52	1	38.92	62.53	-40.75	.90
05:00	-32.52	2	37.80	61.27	-24.91	.90
05:00	-32.52	3	37.76	60.53	-21.30	.90
06:00	-7.97	1	40.53	66.72	-18.26	.90
06:00	-7.97	2	39.45	65.12	-2.01	.90
06:00	-7.97	3	38.56	64.87	1.72	.90
07:00	24.34	1	44.45	70.20	9.74	.90
07:00	24.34	2	42.92	71.73	29.41	.90
07:00	24.34	3	42.10	70.89	32.83	.90
08:00	26.81	1	45.22	71.81	12.11	.90
08:00	26.81	2	43.43	73.74	34.36	.90
08:00	26.81	3	42.36	73.55	38.57	.90
09:00	27.11	1	45.11	73.13	12.25	.90
09:00	27.11	2	43.29	74.01	34.47	.90
09:00	27.11	3	42.61	74.28	38.64	.90
10:00	27.27	1	45.05	73.51	12.57	.90
10:00	27.27	2	43.76	74.28	34.81	.90
10:00	27.27	3	42.77	74.43	38.98	.90
11:00	27.24	1	45.38	72.55	13.48	.90
11:00	27.24	2	43.94	74.51	34.40	.90
11:00	27.24	3	42.84	73.94	38.71	.90

12:00	23.99	1	45.29	72.51	12.29	.90
12:00	23.99	2	43.88	74.82	33.98	.90
12:00	23.99	3	42.83	74.32	38.37	.90
13:00	24.20	1	45.43	72.40	12.46	.90
13:00	24.20	2	43.58	74.86	34.08	.90
13:00	24.20	3	43.07	74.36	38.54	.90
14:00	23.46	1	45.46	72.63	11.87	.90
14:00	23.46	2	43.33	74.78	33.77	.90
14:00	23.46	3	43.08	74.24	38.23	.90
15:00	22.83	1	45.23	72.82	11.24	.90
15:00	22.83	2	43.28	74.78	33.32	.90
15:00	22.83	3	43.04	74.13	37.96	.90
16:00	22.87	1	45.16	72.82	11.41	.90
16:00	22.87	2	43.50	74.63	33.39	.90
16:00	22.87	3	42.95	74.17	38.00	.90
17:00	23.01	1	45.22	72.86	11.41	.90
17:00	23.01	2	43.70	74.70	33.49	.90
17:00	23.01	3	43.06	74.47	38.03	.90
18:00	23.11	1	45.20	72.86	11.52	.90
18:00	23.11	2	44.05	74.86	33.60	.90
18:00	23.11	3	43.01	74.20	38.00	.90
19:00	22.97	1	45.19	72.86	11.38	.90
19:00	22.97	2	43.61	74.86	33.42	.90
19:00	22.97	3	43.18	74.36	37.96	.90
20:00	24.76	1	45.32	72.86	12.92	.90
20:00	24.76	2	43.52	74.82	34.15	.90
20:00	24.76	3	42.98	74.13	38.60	.90
21:00	27.30	1	45.23	72.98	12.39	.90
21:00	27.30	2	43.56	74.66	34.54	.90
21:00	27.30	3	43.12	73.97	38.74	.90
22:00	23.99	1	45.15	73.01	12.36	.90
22:00	23.99	2	43.61	74.74	34.01	.90
22:00	23.99	3	42.97	74.13	38.54	.90
23:15	23.46	1	45.21	72.98	11.94	.90
23:15	23.46	2	43.66	74.63	33.84	.90
23:15	23.46	3	43.04	73.67	38.37	.90
24:00	25.92	1	45.21	73.17	13.41	.90
24:00	25.92	2	43.95	74.40	34.40	.90
24:00	25.92	3	43.10	73.67	38.88	.90
25:00	23.08	1	0.00	999.00	999.00	0.00
25:00	23.08	2	0.00	999.00	999.00	0.00
25:00	23.08	3	0.00	999.00	999.00	0.00

26:00	37.49	1	0.00	999.00	999.00	0.00
26:00	37.49	2	0.00	999.00	999.00	0.00
26:00	37.49	3	0.00	999.00	999.00	0.00
27:00	51.70	1	0.00	999.00	999.00	0.00
27:00	51.70	2	0.00	999.00	999.00	0.00
27:00	51.70	3	0.00	999.00	999.00	0.00
28:00	51.83	1	0.00	999.00	999.00	0.00
28:00	51.83	2	0.00	999.00	999.00	0.00
28:00	51.83	3	0.00	999.00	999.00	0.00
29:00	51.54	1	49.63	89.99	38.23	.90
29:00	51.54	2	46.48	78.46	63.65	.90
29:00	51.54	3	45.85	84.38	68.25	.90
30:00	37.86	1	46.38	90.24	25.25	.90
30:00	37.86	2	44.98	75.55	50.03	.90
30:00	37.86	3	43.42	83.00	54.59	.90
31:00	26.58	1	44.52	99.03	14.39	.90
31:00	26.58	2	43.05	73.01	37.05	.90
31:00	26.58	3	41.66	79.81	41.34	.90
32:00	24.27	1	43.93	88.81	12.78	.90
32:00	24.27	2	42.77	72.25	33.81	.90
32:00	24.27	3	41.40	78.69	38.23	.90
33:00	26.05	1	43.85	89.47	13.55	.90
33:00	26.05	2	42.67	72.21	34.22	.90
33:00	26.05	3	41.54	79.00	38.57	.90
34:00	25.99	1	43.80	89.03	13.45	.90
34:00	25.99	2	42.93	72.17	34.12	.90
34:00	25.99	3	41.68	79.08	38.44	.90
35:00	25.89	1	43.80	88.59	13.41	.90
35:00	25.89	2	42.70	72.55	34.12	.90
35:00	25.89	3	41.55	79.23	38.50	.90
36:00	25.92	1	43.83	89.18	13.48	.90
36:00	25.92	2	42.96	72.71	34.22	.90
36:00	25.92	3	41.74	79.35	38.60	.90
37:00	22.83	1	43.71	89.40	11.31	.90
37:00	22.83	2	42.77	72.94	33.22	.90
37:00	22.83	3	41.63	79.27	37.69	.90
38:00	22.94	1	43.53	90.21	11.34	.90
38:00	22.94	2	43.00	73.09	33.18	.90
38:00	22.94	3	41.48	79.46	37.66	.90
39:00	27.50	1	43.61	90.13	12.57	.90
39:00	27.50	2	42.92	73.05	34.43	.90
39:00	27.50	3	41.59	79.66	38.60	.90

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 40:00    25.99    1   43.56   90.54   13.52    .90
 40:00    25.99    2   43.01   73.51   34.19    .90
 40:00    25.99    3   41.59   79.62   38.50    .90

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COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER:  1  COOLDOWN TIME:  7
COOLER NUMBER:  2  COOLDOWN TIME:  7
COOLER NUMBER:  3  COOLDOWN TIME:  7

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COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER:  1  COOLDOWN TIME:  13
COOLER NUMBER:  2  COOLDOWN TIME:  13
COOLER NUMBER:  3  COOLDOWN TIME:  13
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CYCLE NUMBER: 10 STARTED: 29 Jul 1987 11:30:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:00	-4.46	1	0.00	999.00	999.00	0.00
00:00	-4.46	2	0.00	999.00	999.00	0.00
00:00	-4.46	3	0.00	999.00	999.00	0.00
01:00	23.32	1	0.00	999.00	999.00	0.00
01:00	23.32	2	0.00	999.00	999.00	0.00
01:00	23.32	3	0.00	999.00	999.00	0.00
02:00	-4.79	1	0.00	999.00	999.00	0.00
02:00	-4.79	2	0.00	999.00	999.00	0.00
02:00	-4.79	3	0.00	999.00	999.00	0.00
03:00	-28.51	1	0.00	999.00	999.00	0.00
03:00	-28.51	2	0.00	999.00	999.00	0.00
03:00	-28.51	3	0.00	999.00	999.00	0.00
04:00	-31.70	1	0.00	999.00	999.00	0.00
04:00	-31.70	2	0.00	999.00	999.00	0.00
04:00	-31.70	3	0.00	999.00	999.00	0.00
05:00	-31.02	1	39.88	61.27	-31.47	.90
05:00	-31.02	2	38.00	59.68	-23.70	.90
05:00	-31.02	3	38.49	63.47	-20.17	.90
06:00	-6.94	1	41.04	66.10	-7.35	.90
06:00	-6.94	2	39.25	64.66	-1.09	.90
06:00	-6.94	3	38.98	67.83	2.57	.90
07:00	20.07	1	44.90	70.28	19.47	.90
07:00	20.07	2	42.87	70.28	28.19	.90
07:00	20.07	3	42.23	71.46	31.55	.90
08:00	24.45	1	45.52	71.73	24.23	.90
08:00	24.45	2	43.29	72.32	33.84	.90
08:00	24.45	3	43.02	73.17	38.13	.90
09:00	24.90	1	45.45	71.98	24.59	.90
09:00	24.90	2	43.07	72.40	33.91	.90
09:00	24.90	3	42.87	73.55	38.23	.90
10:00	23.53	1	45.45	72.44	23.64	.90
10:00	23.53	2	42.99	72.55	33.70	.90
10:00	23.53	3	43.10	73.94	38.06	.90
11:00	27.37	1	45.21	73.36	27.50	.90
11:00	27.37	2	43.15	72.71	34.36	.90
11:00	27.37	3	43.13	74.01	38.84	.90

12:00	24.02	1	45.30	72.94	23.99	.90
12:00	24.02	2	43.22	72.86	33.88	.90
12:00	24.02	3	43.07	74.20	38.30	.90
13:00	25.72	1	45.12	73.55	25.11	.90
13:00	25.72	2	43.30	72.82	34.08	.90
13:00	25.72	3	43.12	74.09	38.44	.90
14:00	27.14	1	44.97	74.63	27.30	.90
14:00	27.14	2	43.30	73.09	34.22	.90
14:00	27.14	3	43.03	74.05	38.64	.90
15:00	23.95	1	44.89	74.63	23.99	.90
15:00	23.95	2	43.32	73.55	33.74	.90
15:00	23.95	3	42.97	74.05	38.10	.90
16:00	24.41	1	45.06	75.01	24.30	.90
16:00	24.41	2	43.30	73.59	33.95	.90
16:00	24.41	3	42.78	74.20	38.20	.90
17:00	23.18	1	45.01	75.24	23.25	.90
17:00	23.18	2	43.24	73.67	33.49	.90
17:00	23.18	3	42.59	74.24	37.76	.90
18:00	23.64	1	44.99	75.16	23.67	.90
18:00	23.64	2	43.26	73.51	33.60	.90
18:00	23.64	3	42.91	74.20	37.90	.90
19:00	23.25	1	45.02	75.32	23.32	.90
19:00	23.25	2	43.26	73.74	33.49	.90
19:00	23.25	3	42.87	74.36	37.76	.90
20:00	24.83	1	45.06	75.36	24.59	.90
20:00	24.83	2	43.51	73.63	33.95	.90
20:00	24.83	3	42.87	74.24	38.17	.90
21:00	25.82	1	45.06	75.01	25.22	.90
21:00	25.82	2	43.56	73.74	34.19	.90
21:00	25.82	3	42.83	74.36	38.40	.90
22:00	23.50	1	44.96	75.32	31.24	.90
22:00	23.50	2	43.54	73.82	33.70	.90
22:00	23.50	3	42.58	74.47	37.90	.90
23:00	23.46	1	44.85	75.36	32.77	.90
23:00	23.46	2	43.48	73.59	33.56	.90
23:00	23.46	3	42.60	74.43	37.69	.90
24:00	27.04	1	44.84	75.62	33.67	.90
24:00	27.04	2	43.59	74.05	34.64	.90
24:00	27.04	3	42.69	75.13	39.15	.90
25:00	23.50	1	0.00	999.00	999.00	0.00
25:00	23.50	2	0.00	999.00	999.00	0.00
25:00	23.50	3	0.00	999.00	999.00	0.00

26:00	37.49	1	0.00	999.00	999.00	0.00
26:00	37.49	2	0.00	999.00	999.00	0.00
26:00	37.49	3	0.00	999.00	999.00	0.00
27:00	51.73	1	0.00	999.00	999.00	0.00
27:00	51.73	2	0.00	999.00	999.00	0.00
27:00	51.73	3	0.00	999.00	999.00	0.00
28:00	52.07	1	0.00	999.00	999.00	0.00
28:00	52.07	2	0.00	999.00	999.00	0.00
28:00	52.07	3	0.00	999.00	999.00	0.00
29:00	52.04	1	50.67	79.54	63.70	.90
29:00	52.04	2	46.96	79.39	64.48	.90
29:00	52.04	3	46.09	82.58	69.22	.90
30:00	38.27	1	47.57	78.39	49.92	.90
30:00	38.27	2	45.05	76.20	50.77	.90
30:00	38.27	3	43.96	81.08	55.57	.90
31:00	27.04	1	45.88	76.16	37.08	.90
31:00	27.04	2	43.37	73.51	37.90	.90
31:00	27.04	3	42.05	78.77	42.46	.90
32:00	23.99	1	45.23	75.55	33.46	.90
32:00	23.99	2	43.17	72.67	34.33	.90
32:00	23.99	3	41.96	77.70	38.91	.90
33:00	23.85	1	45.01	75.66	33.15	.90
33:00	23.85	2	43.11	72.63	34.05	.90
33:00	23.85	3	41.89	77.50	38.60	.90
34:00	27.34	1	44.88	76.66	33.63	.90
34:00	27.34	2	43.31	72.90	34.57	.90
34:00	27.34	3	41.89	77.62	39.01	.90
35:00	23.78	1	44.75	77.35	33.15	.90
35:00	23.78	2	43.29	72.98	34.12	.90
35:00	23.78	3	41.79	77.58	38.67	.90
36:00	24.30	1	44.69	77.77	33.25	.90
36:00	24.30	2	43.52	73.17	34.26	.90
36:00	24.30	3	42.09	77.12	38.81	.90
37:00	27.34	1	44.51	78.27	33.63	.90
37:00	27.34	2	43.29	73.17	34.61	.90
37:00	27.34	3	41.91	77.20	39.08	.90
38:00	27.40	1	44.47	78.39	33.56	.90
38:00	27.40	2	43.28	73.40	34.54	.90
38:00	27.40	3	41.89	77.43	38.98	.90
39:00	26.09	1	44.61	78.20	33.56	.90
39:00	26.09	2	43.51	73.63	34.57	.90
39:00	26.09	3	41.93	77.96	39.04	.90

40:00	27.27	1	44.80	77.00	33.67	.90
40:00	27.27	2	43.61	73.70	34.67	.90
40:00	27.27	3	41.92	77.85	39.15	.90
41:00	26.09	1	44.89	76.74	33.67	.90
41:00	26.09	2	43.65	73.74	34.67	.90
41:00	26.09	3	42.03	77.93	39.11	.90
42:00	23.92	1	44.73	77.43	33.15	.90
42:00	23.92	2	43.53	73.78	34.15	.90
42:00	23.92	3	42.03	77.58	39.71	.90
43:00	23.53	1	44.59	78.31	33.04	.90
43:00	23.53	2	43.54	73.74	34.01	.90
43:00	23.53	3	42.11	77.62	38.60	.90
44:00	24.16	1	44.60	78.46	33.18	.90
44:00	24.16	2	43.81	73.97	34.22	.90
44:00	24.16	3	41.88	77.62	38.74	.90
45:00	24.06	1	44.60	78.62	33.22	.90
45:00	24.06	2	43.68	74.13	34.15	.90
45:00	24.06	3	42.14	77.70	38.98	.90
46:00	24.69	1	44.53	78.69	33.32	.90
46:00	24.69	2	43.80	74.01	34.26	.90
46:00	24.69	3	41.96	77.54	39.04	.90
47:00	23.64	1	44.51	78.73	32.97	.90
47:00	23.64	2	43.79	74.59	34.22	.90
47:00	23.64	3	41.94	78.50	38.91	.90
48:00	23.71	1	44.38	78.77	32.80	.90
48:00	23.71	2	44.05	74.43	34.12	.90
48:00	23.71	3	41.96	78.62	38.84	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 8
COOLER NUMBER: 3 COOLDOWN TIME: 9

COOLERS ON: ELAPSED TIME = 39:00

COOLER NUMBER: 1 COOLDOWN TIME: 13
COOLER NUMBER: 2 COOLDOWN TIME: 13
COOLER NUMBER: 3 COOLDOWN TIME: 13

CYCLE NUMBER: 11 STARTED: 31 Jul 1987 13:09:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	23.08	1	0.00	999.00	999.00	0.00
00:15	23.08	2	0.00	999.00	999.00	0.00
00:15	23.08	3	0.00	999.00	999.00	0.00
01:00	22.87	1	0.00	999.00	999.00	0.00
01:00	22.87	2	0.00	999.00	999.00	0.00
01:00	22.87	3	0.00	999.00	999.00	0.00
02:00	-4.71	1	0.00	999.00	999.00	0.00
02:00	-4.71	2	0.00	999.00	999.00	0.00
02:00	-4.71	3	0.00	999.00	999.00	0.00
03:00	-31.47	1	0.00	999.00	999.00	0.00
03:00	-31.47	2	0.00	999.00	999.00	0.00
03:00	-31.47	3	0.00	999.00	999.00	0.00
04:00	-31.92	1	0.00	999.00	999.00	0.00
04:00	-31.92	2	0.00	999.00	999.00	0.00
04:00	-31.92	3	0.00	999.00	999.00	0.00
05:00	-32.22	1	40.10	61.10	-24.61	.90
05:00	-32.22	2	38.64	60.98	-23.25	.90
05:00	-32.22	3	38.16	64.50	-19.12	.90
06:00	-7.57	1	39.98	67.60	-2.70	.90
06:00	-7.57	2	39.55	65.32	-1.60	.90
06:00	-7.57	3	38.44	68.10	2.38	.90
07:00	19.82	1	44.15	71.69	27.11	.90
07:00	19.82	2	43.13	71.27	28.42	.90
07:00	19.82	3	41.69	72.05	32.35	.90
08:00	25.04	1	44.97	73.44	33.04	.90
08:00	25.04	2	43.86	73.79	34.40	.90
08:00	25.04	3	42.43	74.66	39.04	.90
09:00	23.67	1	44.85	74.86	32.80	.90
09:00	23.67	2	43.99	74.24	34.19	.90
09:00	23.67	3	42.39	74.97	38.88	.90
10:00	27.50	1	44.90	75.24	33.56	.90
10:00	27.50	2	43.81	74.51	34.81	.90
10:00	27.50	3	42.40	75.28	39.38	.90
11:00	23.53	1	44.75	75.39	32.80	.90
11:00	23.53	2	44.07	74.78	34.15	.90
11:00	23.53	3	42.91	75.51	36.91	.90

12:00	22.87	1	44.70	75.39	32.49	.90
12:00	22.87	2	43.81	74.90	33.81	.90
12:00	22.87	3	42.50	75.47	38.64	.90
13:00	27.30	1	44.74	75.47	33.39	.90
13:00	27.30	2	44.27	74.78	34.74	.90
13:00	27.30	3	42.88	75.28	39.31	.90
14:00	27.50	1	44.71	75.47	33.60	.90
14:00	27.50	2	43.93	74.55	34.78	.90
14:00	27.50	3	42.82	75.20	39.52	.90
15:00	23.32	1	44.66	75.70	33.70	.90
15:00	23.32	2	43.87	74.51	33.98	.90
15:00	23.32	3	42.73	75.32	38.84	.90
16:00	24.76	1	44.73	75.89	33.25	.90
16:00	24.76	2	43.95	75.36	34.57	.90
16:00	24.76	3	42.76	75.32	39.35	.90
17:00	27.40	1	44.68	75.89	33.49	.90
17:00	27.40	2	43.69	78.46	34.74	.90
17:00	27.40	3	42.92	75.28	39.48	.90
18:00	26.05	1	44.59	76.35	33.42	.90
18:00	26.05	2	44.58	77.77	34.74	.90
18:00	26.05	3	43.14	75.24	39.48	.90
19:00	22.90	1	44.61	76.55	32.38	.90
19:00	22.90	2	44.93	77.39	33.81	.90
19:00	22.90	3	42.96	75.01	38.60	.90
20:00	23.29	1	44.57	76.70	32.73	.90
20:00	23.29	2	45.26	76.24	34.22	.90
20:00	23.29	3	42.77	74.28	38.98	.90
21:00	23.39	1	44.48	76.62	32.66	.90
21:00	23.39	2	45.24	76.01	34.15	.90
21:00	23.39	3	42.32	74.78	38.84	.90
22:00	24.94	1	44.60	76.47	33.18	.90
22:00	24.94	2	45.25	75.78	34.64	.90
22:00	24.94	3	42.91	74.97	39.28	.90
23:00	24.34	1	44.55	76.74	33.11	.90
23:00	24.34	2	45.24	75.59	34.61	.90
23:00	24.34	3	42.96	75.05	39.28	.90
24:00	23.08	1	44.61	76.66	32.63	.90
24:00	23.08	2	44.99	75.97	34.05	.90
24:00	23.08	3	42.81	75.13	38.88	.90
25:00	726.00	1	0.00	999.00	999.00	0.00
25:00	726.00	2	0.00	999.00	999.00	0.00
25:00	726.00	3	0.00	999.00	999.00	0.00

25:00	726.00	1	0.00	999.00	999.00	0.00
26:00	726.00	2	0.00	999.00	999.00	0.00
26:00	726.00	3	0.00	999.00	999.00	0.00
27:00	726.00	1	0.00	999.00	999.00	0.00
27:00	726.00	2	0.00	999.00	999.00	0.00
27:00	726.00	3	0.00	999.00	999.00	0.00
28:00	726.00	1	0.00	999.00	999.00	0.00
28:00	726.00	2	0.00	999.00	999.00	0.00
28:00	726.00	3	0.00	999.00	999.00	0.00
29:00	53.25	1	48.46	81.50	60.47	.90
29:00	53.25	2	45.98	77.93	61.66	.90
29:00	53.25	3	45.76	78.89	66.21	.90
30:00	37.76	1	46.45	82.62	49.69	.90
30:00	37.76	2	44.72	76.66	50.90	.90
30:00	37.76	3	44.27	78.33	56.18	.90
31:00	23.60	1	44.50	79.54	33.67	.90
31:00	23.60	2	42.82	73.44	34.85	.90
31:00	23.60	3	42.15	75.36	39.69	.90
32:00	27.01	1	44.43	79.85	33.53	.90
32:00	27.01	2	42.98	73.17	34.67	.90
32:00	27.01	3	42.47	75.43	39.48	.90
33:00	22.94	1	44.19	79.89	32.38	.90
33:00	22.94	2	42.76	73.24	33.53	.90
33:00	22.94	3	42.38	75.82	38.54	.90
34:00	23.11	1	44.19	79.92	32.56	.90
34:00	23.11	2	42.93	73.44	33.74	.90
34:00	23.11	3	42.45	76.01	38.71	.90
35:00	27.30	1	44.15	80.04	33.33	.90
35:00	27.30	2	42.68	73.70	34.50	.90
35:00	27.30	3	42.37	76.01	39.26	.90
36:00	25.82	1	44.16	80.08	33.25	.90
36:00	25.82	2	42.90	73.94	34.47	.90
36:00	25.82	3	42.54	76.09	39.35	.90
37:00	23.04	1	44.09	80.00	32.52	.90
37:00	23.04	2	43.14	73.86	33.81	.90
37:00	23.04	3	42.43	76.43	38.81	.90
38:00	24.27	1	44.18	80.00	33.01	.90
38:00	24.27	2	43.14	73.86	34.26	.90
38:00	24.27	3	42.48	75.86	39.15	.90
39:00	27.43	1	44.14	79.89	33.49	.90
39:00	27.43	2	43.64	73.40	34.74	.90
39:00	27.43	3	42.75	75.70	38.48	.90

40:00	27.47	1	44.23	79.77	33.46	.90
40:00	27.47	2	44.13	73.24	34.74	.90
40:00	27.47	3	42.55	75.32	39.38	.90
41:00	27.53	1	44.24	79.89	33.63	.90
41:00	27.53	2	44.46	73.94	34.95	.90
41:00	27.53	3	42.67	75.39	39.62	.90
42:00	27.37	1	44.06	80.08	33.32	.90
42:00	27.37	2	44.30	74.01	34.71	.90
42:00	27.37	3	42.66	75.36	39.35	.90
43:00	25.82	1	44.17	79.66	33.29	.90
43:00	25.82	2	44.38	74.47	34.61	.90
43:00	25.82	3	42.77	75.28	39.38	.90
44:00	27.53	1	44.10	80.16	33.60	.90
44:00	27.53	2	44.13	74.66	34.85	.90
44:00	27.53	3	42.69	75.43	39.55	.90
45:00	23.85	1	44.10	80.39	32.94	.90
45:00	23.85	2	43.97	74.70	34.29	.90
45:00	23.85	3	42.83	74.82	39.18	.90
46:00	27.43	1	44.02	80.35	33.39	.90
46:00	27.43	2	44.09	74.66	34.67	.90
46:00	27.43	3	42.76	74.82	39.38	.90
47:00	25.79	1	44.05	80.50	33.29	.90
47:00	25.79	2	43.85	75.01	34.61	.90
47:00	25.79	3	42.56	75.13	39.38	.90
48:00	25.86	1	44.10	80.46	33.25	.90
48:00	25.86	2	44.15	74.97	34.54	.90
48:00	25.86	3	42.64	75.20	39.31	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 8
COOLER NUMBER: 3 COOLDOWN TIME: 9

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 10
COOLER NUMBER: 2 COOLDOWN TIME: 10
COOLER NUMBER: 3 COOLDOWN TIME: 11

CYCLE NUMBER: 12 STARTED: 2 Aug 1987 13:10:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	23.01	1	0.00	999.00	999.00	0.00
00:15	23.01	2	0.00	999.00	999.00	0.00
00:15	23.01	3	0.00	999.00	999.00	0.00
01:00	23.01	1	0.00	999.00	999.00	0.00
01:00	23.01	2	0.00	999.00	999.00	0.00
01:00	23.01	3	0.00	999.00	999.00	0.00
02:00	-4.68	1	0.00	999.00	999.00	0.00
02:00	-4.68	2	0.00	999.00	999.00	0.00
02:00	-4.68	3	0.00	999.00	999.00	0.00
03:00	-31.55	1	0.00	999.00	999.00	0.00
03:00	-31.55	2	0.00	999.00	999.00	0.00
03:00	-31.55	3	0.00	999.00	999.00	0.00
04:00	-32.56	1	0.00	999.00	999.00	0.00
04:00	-32.56	2	0.00	999.00	999.00	0.00
04:00	-32.56	3	0.00	999.00	999.00	0.00
05:00	-30.99	1	40.08	61.63	-24.53	.90
05:00	-30.99	2	39.38	61.92	-23.06	.90
05:00	-30.99	3	39.43	62.78	-18.83	.90
06:00	-7.75	1	39.95	67.76	-2.77	.90
06:00	-7.75	2	39.40	66.61	-1.60	.90
06:00	-7.75	3	38.53	66.59	2.46	.90
07:00	21.99	1	44.14	72.48	27.57	.90
07:00	21.99	2	42.73	71.66	28.75	.90
07:00	21.99	3	41.90	72.48	32.70	.90
08:00	24.06	1	44.95	75.01	32.87	.90
08:00	24.06	2	43.60	73.47	34.15	.90
08:00	24.06	3	42.48	75.39	38.98	.90
09:00	27.30	1	44.90	76.43	33.74	.90
09:00	27.30	2	44.26	74.47	35.06	.90
09:00	27.30	3	42.69	75.78	39.69	.90
10:00	22.66	1	44.84	76.62	32.38	.90
10:00	22.66	2	44.60	74.32	33.91	.90
10:00	22.66	3	42.82	75.47	38.71	.90
11:00	26.97	1	44.82	76.66	33.49	.90
11:00	26.97	2	44.80	74.55	34.88	.90
11:00	26.97	3	43.24	75.66	39.52	.90

12:00	24.09	1	44.79	76.78	33.08	.90
12:00	24.09	2	44.30	74.47	34.43	.90
12:00	24.09	3	43.25	75.24	39.28	.90
13:00	27.47	1	44.87	76.62	33.63	.90
13:00	27.47	2	44.19	75.13	34.85	.90
13:00	27.47	3	43.03	75.28	39.58	.90
14:00	27.24	1	44.92	76.78	33.53	.90
14:00	27.24	2	43.82	75.32	34.81	.90
14:00	27.24	3	43.09	75.28	39.58	.90
15:00	27.30	1	44.95	77.00	33.49	.90
15:00	27.30	2	43.96	75.70	34.74	.90
15:00	27.30	3	43.04	75.20	39.52	.90
16:00	27.30	1	44.86	76.55	33.36	.90
16:00	27.30	2	43.81	76.62	34.57	.90
16:00	27.30	3	43.14	74.90	39.38	.90
17:00	27.50	1	45.04	76.81	33.70	.90
17:00	27.50	2	43.49	76.58	34.85	.90
17:00	27.50	3	42.96	74.74	39.65	.90
18:00	27.34	1	45.13	75.89	33.49	.90
18:00	27.34	2	43.61	77.27	34.61	.90
18:00	27.34	3	42.85	74.78	39.38	.90
19:00	22.83	1	45.18	76.20	32.49	.90
19:00	22.83	2	43.53	77.08	33.70	.90
19:00	22.83	3	42.83	74.82	38.71	.90
20:00	22.94	1	44.94	77.20	32.42	.90
20:00	22.94	2	43.40	77.31	33.67	.90
20:00	22.94	3	42.74	74.97	38.67	.90
21:00	25.99	1	44.99	77.81	33.60	.90
21:00	25.99	2	43.55	77.58	34.78	.90
21:00	25.99	3	42.54	75.47	39.58	.90
22:00	27.27	1	45.17	77.54	33.56	.90
22:00	27.27	2	43.48	77.23	34.67	.90
22:00	27.27	3	42.53	75.55	39.45	.90
23:00	27.20	1	45.44	77.43	33.49	.90
23:00	27.20	2	43.36	76.24	34.61	.90
23:00	27.20	3	42.95	74.82	39.38	.90
24:00	23.22	1	45.67	76.85	32.73	.90
24:00	23.22	2	43.52	76.51	33.88	.90
24:00	23.22	3	42.70	75.09	38.77	.90
25:00	22.90	1	0.00	999.00	999.00	0.00
25:00	22.90	2	0.00	999.00	999.00	0.00
25:00	22.90	3	0.00	999.00	999.00	0.00

26:00	37.35	1	0.00	999.00	999.00	0.00
26:00	37.35	2	0.00	999.00	999.00	0.00
26:00	37.35	3	0.00	999.00	999.00	0.00
27:00	51.89	1	0.00	999.00	999.00	0.00
27:00	51.89	2	0.00	999.00	999.00	0.00
27:00	51.89	3	0.00	999.00	999.00	0.00
28:00	52.20	1	0.00	999.00	999.00	0.00
28:00	52.20	2	0.00	999.00	999.00	0.00
28:00	52.20	3	0.00	999.00	999.00	0.00
29:00	54.64	1	49.53	81.00	63.53	.90
29:00	54.64	2	45.46	78.66	64.57	.90
29:00	54.64	3	45.74	82.54	69.66	.90
30:00	38.81	1	47.03	80.16	50.30	.90
30:00	38.81	2	44.35	76.01	51.34	.90
30:00	38.81	3	44.06	80.04	56.51	.90
31:00	27.86	1	45.08	78.35	37.73	.90
31:00	27.86	2	42.71	73.51	38.77	.90
31:00	27.86	3	42.28	78.20	43.67	.90
32:00	23.57	1	44.39	77.54	32.97	.90
32:00	23.57	2	42.45	72.63	34.05	.90
32:00	23.57	3	41.81	76.97	39.01	.90
33:00	23.11	1	44.42	77.77	32.70	.90
33:00	23.11	2	42.51	72.71	33.81	.90
33:00	23.11	3	41.75	77.04	38.74	.90
34:00	24.52	1	44.48	77.93	32.32	.90
34:00	24.52	2	42.49	72.55	34.47	.90
34:00	24.52	3	41.73	77.30	39.31	.90
35:00	23.81	1	44.41	78.00	32.94	.90
35:00	23.81	2	42.35	73.05	34.05	.90
35:00	23.81	3	41.76	76.97	38.94	.90
36:00	23.04	1	44.44	77.89	32.70	.90
36:00	23.04	2	42.22	72.86	33.81	.90
36:00	23.04	3	41.87	77.35	38.81	.90
37:00	26.12	1	44.53	78.20	33.60	.90
37:00	26.12	2	42.45	72.71	34.64	.90
37:00	26.12	3	42.10	77.23	39.48	.90
38:00	25.66	1	44.41	78.50	33.36	.90
38:00	25.66	2	42.39	72.59	34.47	.90
38:00	25.66	3	42.16	76.89	39.31	.90
39:00	24.38	1	44.37	78.62	33.18	.90
39:00	24.38	2	42.66	72.78	34.33	.90
39:00	24.38	3	42.04	76.55	39.21	.90

40:00	25.29	1	44.39	78.62	33.36	.90
40:00	25.29	2	42.59	73.21	34.43	.90
40:00	25.29	3	42.17	77.46	39.31	.90
41:00	26.02	1	44.48	78.89	33.49	.90
41:00	26.02	2	42.66	74.01	34.57	.90
41:00	26.02	3	42.20	76.74	39.45	.90
42:00	27.53	1	44.41	79.27	33.70	.90
42:00	27.53	2	42.79	73.59	34.78	.90
42:00	27.53	3	42.17	76.43	39.58	.90
43:00	23.11	1	44.21	79.73	32.66	.90
43:00	23.11	2	42.63	73.74	33.91	.90
43:00	23.11	3	41.84	78.23	38.91	.90
44:00	24.20	1	44.19	80.58	33.04	.90
44:00	24.20	2	42.73	73.90	34.29	.90
44:00	24.20	3	41.93	78.08	39.21	.90
45:00	23.01	1	44.11	80.00	32.42	.90
45:00	23.01	2	42.94	74.05	33.70	.90
45:00	23.01	3	41.67	77.93	38.71	.90
46:00	23.29	1	44.00	81.19	32.56	.90
46:00	23.29	2	42.95	74.01	33.84	.90
46:00	23.29	3	41.71	78.66	38.77	.90
47:00	25.08	1	43.96	81.38	33.15	.90
47:00	25.08	2	43.37	73.94	34.50	.90
47:00	25.08	3	41.65	78.69	39.28	.90
48:00	27.24	1	44.14	81.50	33.36	.90
48:00	27.24	2	43.32	74.47	34.57	.90
48:00	27.24	3	41.74	78.54	39.31	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 9
COOLER NUMBER: 3 COOLDOWN TIME: 9

COOLERS ON: ELAPSED TIME = 29:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 13
COOLER NUMBER: 3 COOLDOWN TIME: 13

CYCLE NUMBER: 13 STARTED: 4 Aug 1987 13:11:00

ELAPSED TIME	CHAMBER TEMP (C)	#	POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	23.15	1	0.00	999.00	999.00	0.00
00:15	23.15	2	0.00	999.00	999.00	0.00
00:15	23.15	3	0.00	999.00	999.00	0.00
01:00	22.97	1	0.00	999.00	999.00	0.00
01:00	22.97	2	0.00	999.00	999.00	0.00
01:00	22.97	3	0.00	999.00	999.00	0.00
02:00	-3.69	1	0.00	999.00	999.00	0.00
02:00	-3.69	2	0.00	999.00	999.00	0.00
02:00	-3.69	3	0.00	999.00	999.00	0.00
03:00	-31.29	1	0.00	999.00	999.00	0.00
03:00	-31.29	2	0.00	999.00	999.00	0.00
03:00	-31.29	3	0.00	999.00	999.00	0.00
04:00	-32.19	1	0.00	999.00	999.00	0.00
04:00	-32.19	2	0.00	999.00	999.00	0.00
04:00	-32.19	3	0.00	999.00	999.00	0.00
05:00	-30.46	1	39.86	62.08	-24.23	.90
05:00	-30.46	2	38.95	62.49	-22.80	.90
05:00	-30.46	3	37.80	64.99	-18.75	.90
06:00	-7.09	1	39.85	67.72	-2.26	.90
06:00	-7.09	2	39.54	66.80	-1.02	.90
06:00	-7.09	3	38.54	68.79	3.08	.90
07:00	22.48	1	43.71	72.25	27.73	.90
07:00	22.48	2	42.40	72.78	28.91	.90
07:00	22.48	3	41.62	73.55	32.94	.90
08:00	23.53	1	44.71	73.86	32.77	.90
08:00	23.53	2	42.87	73.63	34.17	.90
08:00	23.53	3	42.47	76.05	39.15	.90
09:00	23.15	1	44.74	74.01	32.59	.90
09:00	23.15	2	43.21	74.01	33.95	.90
09:00	23.15	3	42.40	76.74	38.91	.90
10:00	27.07	1	44.78	74.32	33.46	.90
10:00	27.07	2	43.20	74.43	34.67	.90
10:00	27.07	3	42.66	76.74	39.55	.90
11:00	23.01	1	44.58	74.82	32.56	.90
11:00	23.01	2	43.08	74.59	33.91	.90
11:00	23.01	3	42.44	76.78	38.94	.90

12:00	25.86	1	44.54	75.74	33.22	.90
12:00	25.86	2	43.75	74.13	34.61	.90
12:00	25.86	3	42.63	76.51	39.45	.90
13:00	27.43	1	44.29	76.16	33.42	.90
13:00	27.43	2	43.51	75.09	34.81	.90
13:00	27.43	3	42.58	76.74	39.62	.90
14:00	22.87	1	44.49	76.20	32.45	.90
14:00	22.87	2	43.56	75.32	33.81	.90
14:00	22.87	3	42.69	77.04	38.68	.90
15:00	27.43	1	44.52	76.09	33.53	.90
15:00	27.43	2	43.61	75.47	34.81	.90
15:00	27.43	3	42.71	76.55	39.69	.90
16:00	24.66	1	44.61	75.97	33.08	.90
16:00	24.66	2	43.54	75.97	34.47	.90
16:00	24.66	3	42.69	77.20	39.35	.90
17:00	27.50	1	44.55	76.28	33.53	.90
17:00	27.50	2	43.49	75.97	34.78	.90
17:00	27.50	3	42.63	77.43	39.62	.90
18:00	22.94	1	44.41	76.51	32.42	.90
18:00	22.94	2	43.37	75.86	33.74	.90
18:00	22.94	3	42.35	77.43	38.77	.90
19:00	23.99	1	44.66	76.16	32.94	.90
19:00	23.99	2	43.38	76.01	34.29	.90
19:00	23.99	3	42.62	76.89	39.31	.90
20:00	27.30	1	44.58	76.66	33.39	.90
20:00	27.30	2	43.51	76.16	34.78	.90
20:00	27.30	3	42.49	77.62	39.55	.90
21:00	23.64	1	44.49	76.39	32.80	.90
21:00	23.64	2	43.39	76.28	34.15	.90
21:00	23.64	3	42.29	77.58	39.11	.90
22:00	25.79	1	44.59	76.66	33.32	.90
22:00	25.79	2	43.27	76.24	34.64	.90
22:00	25.79	3	42.31	77.73	39.52	.90
23:15	22.73	1	44.65	75.82	32.42	.90
23:15	22.73	2	43.24	76.12	33.74	.90
23:15	22.73	3	42.32	77.12	38.81	.90
24:00	27.24	1	44.46	76.58	33.29	.90
24:00	27.24	2	43.22	76.05	34.64	.90
24:00	27.24	3	42.40	77.27	39.45	.90
25:00	23.11	1	0.00	999.00	999.00	0.00
25:00	23.11	2	0.00	999.00	999.00	0.00
25:00	23.11	3	0.00	999.00	999.00	0.00

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26:00    37.22    1    0.00  999.00  999.00   0.00
26:00    37.22    2    0.00  999.00  999.00   0.00
26:00    37.22    3    0.00  999.00  999.00   0.00

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COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER:  1  COOLDOWN TIME:  8
COOLER NUMBER:  2  COOLDOWN TIME:  9
COOLER NUMBER:  3  COOLDOWN TIME:  9

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COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER:  1  COOLDOWN TIME: -9999
COOLER NUMBER:  2  COOLDOWN TIME: -9999
COOLER NUMBER:  3  COOLDOWN TIME: -9999
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CYCLE NUMBER: 14 STARTED: 5 Aug 1987 16:16:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:00	39.08	1	0.00	999.00	999.00	0.00
00:00	39.08	2	0.00	999.00	999.00	0.00
00:00	39.08	3	0.00	999.00	999.00	0.00
01:00	23.18	1	0.00	999.00	999.00	0.00
01:00	23.18	2	0.00	999.00	999.00	0.00
01:00	23.18	3	0.00	999.00	999.00	0.00
02:00	-4.16	1	0.00	999.00	999.00	0.00
02:00	-4.16	2	0.00	999.00	999.00	0.00
02:00	-4.16	3	0.00	999.00	999.00	0.00
03:00	-31.70	1	0.00	999.00	999.00	0.00
03:00	-31.70	2	0.00	999.00	999.00	0.00
03:00	-31.70	3	0.00	999.00	999.00	0.00
04:00	-32.30	1	0.00	999.00	999.00	0.00
04:00	-32.30	2	0.00	999.00	999.00	0.00
04:00	-32.30	3	0.00	999.00	999.00	0.00
05:00	-33.46	1	40.32	60.61	-25.06	.90
05:00	-33.46	2	37.74	63.93	-23.70	.90
05:00	-33.46	3	38.09	66.84	-19.24	.90
06:00	-7.05	1	40.25	66.39	-2.23	.90
06:00	-7.05	2	38.76	69.06	-1.13	.90
06:00	-7.05	3	38.91	70.20	3.04	.90
07:00	23.29	1	43.89	71.27	27.73	.90
07:00	23.29	2	42.51	74.01	28.91	.90
07:00	23.29	3	41.15	74.43	32.77	.90
08:00	24.38	1	44.71	72.59	33.04	.90
08:00	24.38	2	43.24	74.24	34.47	.90
08:00	24.38	3	42.11	76.62	39.28	.90
09:00	27.27	1	44.76	72.63	33.29	.90
09:00	27.27	2	43.94	74.36	34.71	.90
09:00	27.27	3	42.25	77.77	39.31	.90
10:00	22.80	1	44.71	72.98	32.35	.90
10:00	22.80	2	45.00	74.59	33.91	.90
10:00	22.80	3	42.09	78.23	38.60	.90
11:00	23.67	1	44.77	72.82	32.87	.90
11:00	23.67	2	45.00	74.43	34.47	.90
11:00	23.67	3	42.36	79.54	39.15	.90

12:00	24.09	1	44.80	72.98	33.01	.90
12:00	24.09	2	45.08	75.28	34.50	.90
12:00	24.09	3	42.49	79.73	39.25	.90
13:00	27.60	1	44.97	73.09	33.60	.90
13:00	27.60	2	44.68	76.55	34.95	.90
13:00	27.60	3	43.00	79.54	39.62	.90
14:00	25.66	1	44.98	73.09	33.15	.90
14:00	25.66	2	44.57	76.55	34.61	.90
14:00	25.66	3	42.82	79.96	39.42	.90
15:00	23.60	1	44.90	73.32	32.77	.90
15:00	23.60	2	44.09	77.00	34.19	.90
15:00	23.60	3	42.86	79.92	39.08	.90
16:00	22.62	1	44.64	74.70	32.24	.90
16:00	22.62	2	44.20	79.39	33.74	.90
16:00	22.62	3	42.78	80.04	38.67	.90
17:00	23.99	1	44.77	74.86	32.83	.90
17:00	23.99	2	44.09	77.12	34.33	.90
17:00	23.99	3	42.78	79.85	39.15	.90
18:00	24.02	1	44.86	73.17	32.80	.90
18:00	24.02	2	43.75	77.89	34.22	.90
18:00	24.02	3	42.34	79.23	39.04	.90
19:00	23.15	1	44.90	73.55	32.49	.90
19:00	23.15	2	44.12	78.12	33.98	.90
19:00	23.15	3	42.29	79.19	38.77	.90
20:00	24.23	1	44.84	73.40	33.01	.90
20:00	24.23	2	44.16	78.31	34.47	.90
20:00	24.23	3	42.17	78.89	39.18	.90
21:15	27.34	1	44.97	73.59	33.39	.90
21:15	27.34	2	44.30	77.93	34.85	.90
21:15	27.34	3	42.14	78.85	39.42	.90
22:00	27.17	1	44.81	73.78	33.29	.90
22:00	27.17	2	44.28	78.00	34.71	.90
22:00	27.17	3	42.00	78.96	39.28	.90
23:00	23.08	1	44.67	73.70	32.42	.90
23:00	23.08	2	44.03	77.66	33.91	.90
23:00	23.08	3	42.19	79.16	38.71	.90
24:00	24.09	1	44.77	73.86	32.90	.90
24:00	24.09	2	44.22	76.74	34.40	.90
24:00	24.09	3	42.26	79.23	39.11	.90
25:00	23.18	1	0.00	999.00	999.00	0.00
25:00	23.18	2	0.00	999.00	999.00	0.00
25:00	23.18	3	0.00	999.00	999.00	0.00

26:00	37.02	1	0.00	999.00	999.00	0.00
26:00	37.02	2	0.00	999.00	999.00	0.00
26:00	37.02	3	0.00	999.00	999.00	0.00
27:00	51.85	1	0.00	999.00	999.00	0.00
27:00	51.85	2	0.00	999.00	999.00	0.00
27:00	51.85	3	0.00	999.00	999.00	0.00
28:00	52.26	1	0.00	999.00	999.00	0.00
28:00	52.26	2	0.00	999.00	999.00	0.00
28:00	52.26	3	0.00	999.00	999.00	0.00
29:00	55.62	1	49.19	81.04	63.87	.90
29:00	55.62	2	45.02	81.42	64.72	.90
29:00	55.62	3	46.24	80.65	70.05	.90
30:00	37.93	1	46.60	79.54	49.38	.90
30:00	37.93	2	43.66	78.58	50.57	.90
30:00	37.93	3	44.20	78.62	55.91	.90
31:00	25.01	1	44.76	77.20	34.95	.90
31:00	25.01	2	42.07	75.28	36.24	.90
31:00	25.01	3	42.07	76.05	41.27	.90
32:00	24.23	1	44.51	76.20	33.01	.90
32:00	24.23	2	42.07	74.90	34.15	.90
32:00	24.23	3	41.74	76.05	39.15	.90
33:00	22.69	1	44.34	76.32	32.28	.90
33:00	22.69	2	42.03	74.78	33.46	.90
33:00	22.69	3	41.74	75.93	38.54	.90
34:00	27.50	1	44.36	77.08	33.46	.90
34:00	27.50	2	42.30	74.74	34.54	.90
34:00	27.50	3	42.00	76.43	39.38	.90
35:00	24.02	1	44.19	77.96	32.97	.90
35:00	24.02	2	42.36	74.90	34.15	.90
35:00	24.02	3	41.81	76.70	39.11	.90
36:00	22.97	1	44.03	78.31	32.31	.90
36:00	22.97	2	42.56	75.20	33.56	.90
36:00	22.97	3	41.64	76.89	38.54	.90
37:00	23.74	1	43.95	79.12	32.77	.90
37:00	23.74	2	42.75	75.47	34.05	.90
37:00	23.74	3	41.79	77.04	38.98	.90
38:00	22.73	1	43.96	79.50	32.21	.90
38:00	22.73	2	42.79	75.24	33.53	.90
38:00	22.73	3	41.81	77.12	38.50	.90
39:00	23.22	1	43.95	79.62	32.52	.90
39:00	23.22	2	43.29	74.93	33.88	.90
38:00	23.22	3	41.81	77.12	38.77	.90

40:00	25.92	1	43.97	79.85	33.11	.90
40:00	25.92	2	43.61	75.74	34.50	.90
40:00	25.92	3	41.83	77.31	39.18	.90
41:00	25.95	1	44.16	79.39	33.32	.90
41:00	25.95	2	43.83	75.55	34.71	.90
41:00	25.95	3	42.12	76.97	39.45	.90
42:00	23.78	1	43.99	79.50	32.73	.90
42:00	23.78	2	43.71	75.79	34.15	.90
42:00	23.78	3	41.82	77.31	38.94	.90
43:15	27.37	1	43.93	79.89	33.29	.90
43:15	27.37	2	44.03	76.09	34.67	.90
43:15	27.37	3	42.06	77.04	39.31	.90
44:00	22.87	1	43.81	80.16	32.38	.90
44:00	22.87	2	44.15	76.58	33.84	.90
44:00	22.87	3	41.68	77.27	38.71	.90
45:00	27.30	1	43.71	80.39	33.15	.90
45:00	27.30	2	44.13	76.70	34.61	.90
45:00	27.30	3	41.68	77.66	39.18	.90
46:00	24.20	1	43.84	80.58	32.94	.90
46:00	24.20	2	44.15	76.93	34.43	.90
46:00	24.20	3	41.74	78.00	39.11	.90
47:00	27.53	1	43.95	80.69	33.36	.90
47:00	27.53	2	44.31	79.12	34.74	.90
47:00	27.53	3	41.97	77.73	39.38	.90
48:00	24.23	1	44.10	80.19	32.97	.90
48:00	24.23	2	44.37	77.81	34.47	.90
48:00	24.23	3	41.90	78.12	39.18	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 8
COOLER NUMBER: 3 COOLDOWN TIME: 9

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 13
COOLER NUMBER: 3 COOLDOWN TIME: 13

CYCLE NUMBER: 15 STARTED: 7 Aug 1987 16:19:00

ELAPSED TIME	CHAMBER TEMP (C)	#	POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	HEAT LOAD (W)
00:15	23.11	1	0.00	999.00	999.00	0.00
00:15	23.11	2	0.00	999.00	999.00	0.00
00:15	23.11	3	0.00	999.00	999.00	0.00
01:00	22.97	1	0.00	999.00	999.00	0.00
01:00	22.97	2	0.00	999.00	999.00	0.00
01:00	22.97	3	0.00	999.00	999.00	0.00
02:00	-4.38	1	0.00	999.00	999.00	0.00
02:00	-4.38	2	0.00	999.00	999.00	0.00
02:00	-4.38	3	0.00	999.00	999.00	0.00
03:00	-31.70	1	0.00	999.00	999.00	0.00
03:00	-31.70	2	0.00	999.00	999.00	0.00
03:00	-31.70	3	0.00	999.00	999.00	0.00
04:00	-31.77	1	0.00	999.00	999.00	0.00
04:00	-31.77	2	0.00	999.00	999.00	0.00
04:00	-31.77	3	0.00	999.00	999.00	0.00
05:00	-32.71	1	39.63	62.53	-25.21	.90
05:00	-32.71	2	38.33	63.60	-23.70	.90
05:00	-32.71	3	38.81	65.24	-19.27	.90
06:00	-6.87	1	39.68	67.60	-2.15	.90
06:00	-6.87	2	40.28	68.90	-.80	.90
06:00	-6.87	3	38.84	69.44	3.37	.90
07:00	23.32	1	43.36	72.48	21.66	.90
07:00	23.32	2	43.81	78.23	29.08	.90
07:00	23.32	3	41.13	74.28	32.77	.90
08:00	22.55	1	44.10	74.40	32.11	.90
08:00	22.55	2	44.70	81.38	33.81	.90
08:00	22.55	3	41.92	76.93	38.44	.90
09:00	22.80	1	44.00	75.86	32.24	.90
09:00	22.80	2	45.80	75.59	33.98	.90
09:00	22.80	3	42.07	77.66	38.57	.90
10:00	27.37	1	44.13	75.93	33.25	.90
10:00	27.37	2	45.75	74.82	34.95	.90
10:00	27.37	3	42.39	77.89	39.35	.90
11:00	23.46	1	44.19	76.09	32.70	.90
11:00	23.46	2	45.77	74.74	34.48	.90
11:00	23.46	3	42.53	79.00	39.08	.90

12:00	22.97	1	44.12	76.09	32.42	.90
12:00	22.97	2	46.13	75.97	34.15	.90
12:00	22.97	3	42.67	78.69	38.88	.90
13:00	24.06	1	44.47	75.62	32.90	.90
13:00	24.06	2	46.00	75.74	34.57	.90
13:00	24.06	3	43.31	77.64	39.31	.90
14:00	24.83	1	44.60	75.32	33.15	.90
14:00	24.83	2	45.92	75.43	34.81	.90
14:00	24.83	3	43.35	79.00	39.52	.90
15:00	22.94	1	44.36	76.47	32.42	.90
15:00	22.94	2	45.58	76.16	34.12	.90
15:00	22.94	3	42.44	79.23	38.98	.90
16:00	24.87	1	44.59	76.12	33.18	.90
16:00	24.87	2	45.57	77.04	34.85	.90
16:00	24.87	3	44.16	78.12	39.62	.90
17:15	23.79	1	45.51	75.89	32.97	.90
17:15	23.79	2	45.52	76.78	34.50	.90
17:15	23.78	3	44.01	80.73	39.35	.90
18:00	25.92	1	45.55	75.78	33.39	.90
18:00	25.92	2	45.24	76.32	34.85	.90
18:00	25.92	3	44.09	78.73	39.69	.90
19:00	25.96	1	45.39	76.01	33.36	.90
19:00	25.96	2	45.70	76.39	34.88	.90
19:00	25.96	3	43.94	78.43	39.69	.90
20:00	25.95	1	45.13	76.85	33.36	.90
20:00	25.95	2	45.55	76.35	34.92	.90
20:00	25.95	3	43.56	77.23	39.62	.90
21:00	23.50	1	44.99	77.12	32.77	.90
21:00	23.50	2	45.36	75.55	34.36	.90
21:00	23.50	3	43.25	76.12	39.18	.90
22:00	27.34	1	44.84	77.16	33.46	.90
22:00	27.34	2	45.65	75.28	35.02	.90
22:00	27.34	3	42.55	75.55	39.52	.90
23:00	23.29	1	44.83	76.85	32.70	.90
23:00	23.29	2	45.32	74.86	34.26	.90
23:00	23.29	3	42.08	76.01	38.91	.90
24:00	27.30	1	44.85	75.97	33.32	.90
24:00	27.30	2	45.28	75.38	34.88	.90
24:00	27.30	3	42.31	75.97	39.35	.90
25:00	23.32	1	0.00	999.00	999.00	0.00
25:00	23.32	2	0.00	999.00	999.00	0.00
25:00	23.32	3	0.00	999.00	999.00	0.00

26:00	37.49	1	0.00	999.00	999.00	0.00
26:00	37.49	2	0.00	999.00	999.00	0.00
26:00	37.49	3	0.00	999.00	999.00	0.00
27:00	51.65	1	0.00	999.00	999.00	0.00
27:00	51.65	2	0.00	999.00	999.00	0.00
27:00	51.65	3	0.00	999.00	999.00	0.00
28:00	52.18	1	0.00	999.00	999.00	0.00
28:00	52.18	2	0.00	999.00	999.00	0.00
28:00	52.18	3	0.00	999.00	999.00	0.00
29:00	51.63	1	48.84	78.96	62.82	.90
29:00	51.63	2	45.39	82.62	63.99	.90
29:00	51.63	3	46.33	81.00	69.38	.90
30:00	39.62	1	47.69	77.27	50.30	.90
30:00	39.62	2	44.00	79.89	51.58	.90
30:00	39.62	3	44.33	79.04	56.78	.90
31:00	25.15	1	44.71	74.59	35.06	.90
31:00	25.15	2	42.28	76.74	36.34	.90
31:00	25.15	3	41.99	76.85	41.34	.90
32:00	27.50	1	44.29	74.32	33.49	.90
32:00	27.50	2	42.12	76.32	34.54	.90
32:00	27.50	3	41.77	75.78	39.35	.90
33:00	23.04	1	44.22	74.28	32.42	.90
33:00	23.04	2	42.19	76.20	33.63	.90
33:00	23.04	3	41.64	76.01	38.64	.90
34:00	23.74	1	44.39	74.47	32.83	.90
34:00	23.74	2	42.37	76.39	34.08	.90
34:00	23.74	3	41.98	75.59	39.04	.90
35:00	24.73	1	44.44	74.13	33.15	.90
35:00	24.73	2	42.53	75.97	34.40	.90
75:00	24.73	3	41.90	75.62	39.21	.90
36:00	23.43	1	44.24	74.59	32.63	.90
36:00	23.43	2	42.50	76.35	33.91	.90
36:00	23.43	3	41.96	75.78	38.80	.90
37:00	23.04	1	44.09	74.82	32.42	.90
37:00	23.04	2	42.75	76.81	33.74	.90
37:00	23.04	3	41.98	77.31	38.71	.90
38:00	24.87	1	44.16	74.93	33.08	.90
38:00	24.87	2	43.08	76.58	34.43	.90
38:00	24.87	3	42.21	80.77	39.28	.90
39:00	27.43	1	44.25	74.97	33.39	.90
39:00	27.43	2	43.07	76.81	34.78	.90
39:00	27.43	3	42.95	80.42	39.58	.90

40:00	23.60	1	44.21	74.74	32.80	.90
40:00	23.60	2	43.41	76.97	34.19	.90
40:00	23.60	3	43.10	79.42	39.18	.90
41:00	23.57	1	44.03	75.20	32.73	.90
41:00	23.57	2	44.30	77.62	34.29	.90
41:00	23.57	3	43.02	78.46	39.15	.90
42:00	23.32	1	44.17	75.24	32.56	.90
42:00	23.32	2	44.35	78.08	34.08	.90
42:00	23.32	3	42.19	78.39	38.88	.90
43:00	23.01	1	44.10	75.16	32.42	.90
43:00	23.01	2	45.15	77.46	34.05	.90
43:00	23.01	3	41.94	78.27	38.71	.90
44:00	27.50	1	44.47	74.59	33.56	.90
44:00	27.50	2	45.52	76.74	35.06	.90
44:00	27.50	3	41.83	78.23	39.48	.90
45:00	27.40	1	44.04	75.16	33.39	.90
45:00	27.40	2	46.09	76.16	35.09	.90
45:00	27.40	3	42.11	77.70	39.45	.90
46:00	23.92	1	44.15	75.20	33.01	.90
46:00	23.92	2	46.05	74.97	34.71	.90
46:00	23.92	3	42.12	76.97	39.25	.90
47:00	22.94	1	44.07	75.01	32.38	.90
47:00	22.94	2	45.40	75.36	34.08	.90
47:00	22.94	3	41.57	76.66	38.64	.90
48:00	27.43	1	44.06	75.16	33.39	.90
48:00	27.43	2	45.01	75.51	34.95	.90
48:00	27.43	3	41.94	76.62	39.42	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 9
COOLER NUMBER: 3 COOLDOWN TIME: 9

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 13
COOLER NUMBER: 3 COOLDOWN TIME: 13

CYCLE NUMBER: 16 STARTED: 11 Aug 1987 09:00:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:00	26.02	1	0.00	999.00	999.00	0.00
00:00	26.02	2	0.00	999.00	999.00	0.00
00:00	26.02	3	0.00	999.00	999.00	0.00
01:00	23.04	1	0.00	999.00	999.00	0.00
01:00	23.04	2	0.00	999.00	999.00	0.00
01:00	23.04	3	0.00	999.00	999.00	0.00
02:00	-4.57	1	0.00	999.00	999.00	0.00
02:00	-4.57	2	0.00	999.00	999.00	0.00
02:00	-4.57	3	0.00	999.00	999.00	0.00
03:00	-31.92	1	0.00	999.00	999.00	0.00
03:00	-31.92	2	0.00	999.00	999.00	0.00
03:00	-31.92	3	0.00	999.00	999.00	0.00
04:00	-32.64	1	0.00	999.00	999.00	0.00
04:00	-32.64	2	0.00	999.00	999.00	0.00
04:00	-32.64	3	0.00	999.00	999.00	0.00
05:00	-33.24	1	39.62	61.83	-25.66	.90
05:00	-33.24	2	38.22	67.95	-23.48	.90
05:00	-33.24	3	37.66	69.63	-19.69	.90
06:00	-8.00	1	39.86	67.76	-3.36	.90
06:00	-8.00	2	39.23	73.01	-1.71	.90
06:00	-8.00	3	37.81	73.17	1.80	.90
07:00	22.03	1	43.28	72.09	27.27	.90
07:00	22.03	2	41.49	78.66	28.91	.90
07:00	22.03	3	40.16	76.66	32.24	.90
08:00	25.15	1	44.17	73.28	32.94	.90
08:00	25.15	2	42.30	80.00	34.92	.90
08:00	25.15	3	40.76	78.62	38.98	.90
09:00	25.79	1	44.26	73.51	33.08	.90
09:00	25.79	2	42.15	80.65	35.02	.90
09:00	25.79	3	41.10	78.39	39.08	.90
10:00	23.99	1	44.22	73.44	32.63	.90
10:00	23.99	2	42.21	80.42	34.67	.90
10:00	23.99	3	40.95	78.00	38.81	.90
11:00	23.04	1	44.26	73.17	32.24	.90
11:00	23.04	2	42.16	80.42	34.26	.90
11:00	23.04	3	41.07	78.31	38.40	.90

12:00	23.08	1	44.31	73.21	32.17	.90
12:00	23.08	2	42.29	80.69	34.19	.90
12:00	23.08	3	41.31	78.20	38.40	.90
13:00	24.16	1	44.44	73.36	32.73	.90
13:00	24.16	2	42.50	80.65	34.74	.90
13:00	24.16	3	41.40	78.73	38.91	.90
14:00	24.23	1	44.34	73.51	32.77	.90
14:00	24.23	2	42.68	80.96	34.81	.90
14:00	24.23	3	41.41	79.08	38.94	.90
15:00	22.80	1	44.36	73.36	32.04	.90
15:00	22.80	2	42.67	80.92	34.12	.90
15:00	22.80	3	41.80	78.96	38.33	.90
16:00	25.95	1	44.44	73.67	33.25	.90
16:00	25.95	2	42.96	80.58	35.36	.90
16:00	25.95	3	42.07	79.16	39.38	.90
17:00	22.90	1	44.19	73.63	32.07	.90
17:00	22.90	2	42.78	80.85	34.19	.90
17:00	22.90	3	42.44	82.35	38.50	.90
18:00	22.73	1	44.27	73.59	32.00	.90
18:00	22.73	2	43.13	80.73	34.15	.90
18:00	22.73	3	43.43	81.08	38.47	.90
19:00	27.40	1	44.41	73.78	33.32	.90
19:00	27.40	2	43.19	80.96	35.13	.90
19:00	27.40	3	43.27	81.62	39.42	.90
20:00	27.27	1	44.27	73.86	33.46	.90
20:00	27.27	2	44.23	82.46	35.43	.90
20:00	27.27	3	42.33	80.19	39.38	.90
21:00	23.08	1	44.34	74.13	32.28	.90
21:00	23.08	2	44.27	82.16	34.64	.90
21:00	23.08	3	42.16	79.81	38.77	.90
22:00	24.62	1	44.17	74.43	32.90	.90
22:00	24.62	2	44.26	81.00	35.09	.90
22:00	24.62	3	41.60	79.89	39.08	.90

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------------------------------------------------------------
COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER:  1  COOLDOWN TIME:  8
COOLER NUMBER:  2  COOLDOWN TIME:  8
COOLER NUMBER:  3  COOLDOWN TIME:  9

------------------------------------------------------------
COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER:  1  COOLDOWN TIME: -9999
COOLER NUMBER:  2  COOLDOWN TIME: -9999
COOLER NUMBER:  3  COOLDOWN TIME: -9999
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CYCLE NUMBER: 17 STARTED: 12 Aug 1987 09:43:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:00	29.44	1	0.00	999.00	999.00	0.00
00:00	29.44	2	0.00	999.00	999.00	0.00
00:00	29.44	3	0.00	999.00	999.00	0.00
01:00	22.90	1	0.00	999.00	999.00	0.00
01:00	22.90	2	0.00	999.00	999.00	0.00
01:00	22.90	3	0.00	999.00	999.00	0.00
02:00	999.00	1	0.00	999.00	999.00	0.00
02:00	999.00	2	0.00	999.00	999.00	0.00
02:00	999.00	3	0.00	999.00	999.00	0.00
03:00	999.00	1	0.00	999.00	999.00	0.00
03:00	999.00	2	0.00	999.00	999.00	0.00
03:00	999.00	3	0.00	999.00	999.00	0.00
04:00	-32.45	1	0.00	999.00	999.00	0.00
04:00	-32.45	2	0.00	999.00	999.00	0.00
04:00	-32.45	3	0.00	999.00	999.00	0.00
05:00	-30.65	1	38.49	63.52	-22.20	.90
05:00	-30.65	2	39.18	67.76	-20.17	.90
05:00	-30.65	3	39.48	72.32	-16.69	.90
06:00	-7.89	1	39.92	67.91	-2.30	.90
06:00	-7.89	2	40.87	73.82	-.43	.90
06:00	-7.89	3	38.74	75.70	2.97	.90
07:00	24.27	1	43.94	71.73	28.42	.90
07:00	24.27	2	42.57	78.81	30.23	.90
07:00	24.27	3	41.51	79.08	33.39	.90
08:00	24.52	1	44.78	72.98	32.42	.90
08:00	24.52	2	43.31	80.62	34.61	.90
08:00	24.52	3	41.50	81.54	37.69	.90
09:00	24.16	1	44.65	73.36	32.28	.90
09:00	24.16	2	44.87	81.46	34.61	.90
09:00	24.16	3	40.49	79.27	37.29	.90
10:00	23.88	1	44.82	73.09	32.07	.90
10:00	23.88	2	44.85	79.58	34.36	.90
10:00	23.88	3	40.58	78.66	37.08	.90
11:00	23.53	1	44.71	73.09	31.79	.90
11:00	23.53	2	45.01	79.46	34.12	.90
11:00	23.53	3	40.45	78.04	36.85	.90

```
 12:00    23.25    1   44.67   72.86   31.52    .90
 12:00    23.25    2   44.68   79.00   33.81    .90
 12:00    23.25    3   40.22   78.12   36.51    .90

 13:00    23.29    1   44.57   73.05   31.45    .90
 13:00    23.29    2   44.28   79.04   33.67    .90
 13:00    23.29    3   40.31   77.85   36.41    .90

 24:00   999.00    1   45.00   72.00   34.00   99.00
 24:00   999.00    2   41.40   76.80   36.10   99.00
 24:00   999.00    3   41.80   77.90   39.30   99.00

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COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER:  1  COOLDOWN TIME:  8
COOLER NUMBER:  2  COOLDOWN TIME:  8
COOLER NUMBER:  3  COOLDOWN TIME:  8

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COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER:  1  COOLDOWN TIME: -9999
COOLER NUMBER:  2  COOLDOWN TIME: -9999
COOLER NUMBER:  3  COOLDOWN TIME: -9999
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CYCLE NUMBER: 18 STARTED: 14 Aug 1987 08:27:00

ELAPSED TIME	CHAMBER TEMP (C)	#	POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	HEAT LOAD (W)
00:00	22.38	1	0.00	999.00	999.00	0.00
00:00	22.38	2	0.00	999.00	999.00	0.00
00:00	22.38	3	0.00	999.00	999.00	0.00
01:00	23.09	1	0.00	999.00	999.00	0.00
01:00	23.09	2	0.00	999.00	999.00	0.00
01:00	23.08	3	0.00	999.00	999.00	0.00
02:00	-4.75	1	0.00	999.00	999.00	0.00
02:00	-4.75	2	0.00	999.00	999.00	0.00
02:00	-4.75	3	0.00	999.00	999.00	0.00
03:00	-31.70	1	0.00	999.00	999.00	0.00
03:00	-31.70	2	0.00	999.00	999.00	0.00
03:00	-31.70	3	0.00	999.00	999.00	0.00
04:00	-31.92	1	0.00	999.00	999.00	0.00
04:00	-31.92	2	0.00	999.00	999.00	0.00
04:00	-31.92	3	0.00	999.00	999.00	0.00
05:00	-34.55	1	39.46	61.96	-25.73	.90
05:00	-34.55	2	39.71	67.41	-23.06	.90
05:00	-34.55	3	37.67	70.24	-19.20	.90
06:00	-7.09	1	40.04	67.49	-2.41	.90
06:00	-7.09	2	41.36	74.51	-.54	.90
06:00	-7.09	3	37.94	75.05	3.00	.90
07:00	24.45	1	43.62	72.17	28.12	.90
07:00	24.45	2	42.69	79.89	29.80	.90
07:00	24.45	3	4 .36	80.46	33.42	.90
08:00	26.71	1	44.47	73.09	33.04	.90
08:00	26.71	2	43.38	80.73	35.16	.90
08:00	26.71	3	43.29	80.62	39.58	.90
09:00	27.17	1	44.64	73.17	33.39	.90
09:00	27.17	2	43.50	80.12	35.53	.90
09:00	27.17	3	42.55	80.62	39.62	.90
10:00	22.83	1	44.70	73.24	31.90	.90
10:00	22.83	2	43.43	79.16	34.33	.90
10:00	22.83	3	42.24	79.92	38.74	.90
11:00	23.22	1	44.71	73.17	32.14	.90
11:00	23.22	2	42.64	78.73	34.43	.90
11:00	23.22	3	41.05	79.42	38.71	.90

12:00	23.25	1	44.76	73.63	32.21	.90
12:00	23.25	2	42.84	78.50	34.43	.90
12:00	23.25	3	40.58	79.31	38.74	.90
13:00	23.43	1	44.80	73.47	32.24	.90
13:00	23.43	2	42.82	78.58	34.47	.90
13:00	23.43	3	40.60	78.77	38.71	.90
14:00	25.95	1	44.85	73.55	33.01	.90
14:00	25.95	2	42.62	79.73	35.02	.90
14:00	25.95	3	40.38	78.62	39.18	.90
15:00	27.04	1	44.65	73.67	33.08	.90
15:00	27.04	2	42.41	79.16	34.88	.90
15:00	27.04	3	40.33	78.96	38.99	.90
16:00	23.53	1	44.78	73.86	32.28	.90
16:00	23.53	2	42.37	79.12	34.50	.90
16:00	23.53	3	40.71	78.85	38.84	.90
17:00	23.22	1	44.73	73.90	32.24	.90
17:00	23.22	2	41.66	78.93	34.47	.90
17:00	23.22	3	41.23	79.39	38.94	.90
18:00	27.60	1	44.70	74.28	33.36	.90
18:00	27.60	2	42.05	78.66	35.16	.90
18:00	27.60	3	40.71	79.42	39.35	.90
19:15	23.04	1	44.57	74.51	31.97	.90
19:15	23.04	2	41.91	78.27	34.15	.90
19:15	23.04	3	40.70	79.19	38.54	.90
20:00	23.11	1	44.62	74.47	32.17	.90
20:00	23.11	2	42.07	78.69	34.40	.90
20:00	23.11	3	41.71	79.58	38.84	.90
21:00	23.43	1	44.60	74.59	32.24	.90
21:00	23.43	2	41.78	79.27	34.47	.90
21:00	23.43	3	41.05	79.66	38.88	.90
22:00	23.32	1	44.58	74.40	32.17	.90
22:00	23.32	2	42.43	78.50	34.43	.90
22:00	23.32	3	41.72	79.31	38.91	.90
23:00	22.73	1	44.60	74.28	31.79	.90
23:00	22.73	2	42.36	78.43	34.08	.90
23:00	22.73	3	41.29	78.85	38.54	.90
24:00	23.29	1	44.66	74.51	32.24	.90
24:00	23.29	2	42.98	78.73	34.64	.90
24:00	23.29	3	41.79	79.54	39.11	.90
25:00	22.97	1	0.00	999.00	999.00	0.00
25:00	22.97	2	0.00	999.00	999.00	0.00
25:00	22.97	3	0.00	999.00	999.00	0.00

26:00	37.39	1	0.00	999.00	999.00	0.00
26:00	37.39	2	0.00	999.00	999.00	0.00
26:00	37.39	3	0.00	999.00	999.00	0.00
27:00	51.78	1	0.00	999.00	999.00	0.00
27:00	51.78	2	0.00	999.00	999.00	0.00
27:00	51.78	3	0.00	999.00	999.00	0.00
28:00	52.01	1	0.00	999.00	999.00	0.00
28:00	52.01	2	0.00	999.00	999.00	0.00
28:00	52.01	3	0.00	999.00	999.00	0.00
29:00	52.40	1	49.55	79.16	62.67	.90
29:00	52.40	2	45.34	84.23	64.73	.90
29:00	52.40	3	47.33	88.63	69.81	.90
30:00	37.83	1	46.90	78.43	48.94	.90
30:00	37.83	2	44.42	81.46	51.41	.90
30:00	37.83	3	45.11	87.56	56.34	.90
31:00	24.76	1	44.65	76.09	34.36	.90
31:00	24.76	2	44.08	78.20	36.95	.90
31:00	24.76	3	41.58	81.35	41.07	.90
32:00	27.50	1	44.67	74.86	33.46	.90
32:00	27.50	2	42.92	77.27	35.46	.90
32:00	27.50	3	41.34	80.77	39.38	.90
33:00	22.90	1	44.35	75.20	32.04	.90
33:00	22.90	2	42.33	76.97	34.36	.90
33:00	22.90	3	40.98	81.04	38.67	.90
34:00	27.73	1	44.50	75.24	33.46	.90
34:00	27.73	2	42.25	77.00	35.46	.90
34:00	27.73	3	40.83	80.65	39.45	.90
35:00	27.43	1	44.35	75.74	33.39	.90
35:00	27.43	2	42.75	77.70	35.43	.90
35:00	27.43	3	41.63	81.12	39.42	.90
36:00	24.20	1	44.30	76.35	32.66	.90
36:00	24.20	2	42.60	77.58	34.95	.90
36:00	24.20	3	40.82	80.85	39.18	.90
37:00	27.24	1	44.10	77.12	33.15	.90
37:00	27.24	2	42.46	77.50	35.09	.90
37:00	27.24	3	40.74	81.00	39.21	.90
38:00	27.24	1	44.03	77.66	33.25	.90
38:00	27.24	2	42.06	77.66	35.13	.90
38:00	27.24	3	40.53	81.19	39.18	.90
39:00	23.71	1	44.01	77.70	32.38	.90
39:00	23.71	2	42.01	78.50	34.67	.90
39:00	23.71	3	40.46	81.15	38.98	.90

40:00	23.11	1	43.92	77.96	32.07	.90
40:00	23.11	2	42.13	78.35	34.40	.90
40:00	23.11	3	40.74	81.23	38.67	.90
41:00	23.92	1	43.98	77.89	32.38	.90
41:00	23.92	2	42.22	77.66	34.74	.90
41:00	23.92	3	40.84	81.69	39.04	.90
42:00	24.30	1	44.06	77.77	32.56	.90
42:00	24.30	2	42.26	76.47	34.81	.90
42:00	24.30	3	40.95	81.42	38.01	.90
43:15	23.22	1	44.11	77.89	32.14	.90
43:15	23.22	2	43.36	76.93	34.61	.90
43:15	23.22	3	40.78	81.46	38.77	.90
44:00	25.76	1	43.88	78.16	32.80	.90
44:00	25.76	2	42.82	77.12	35.06	.90
44:00	25.76	3	40.94	81.35	39.11	.90
45:15	22.76	1	43.72	78.31	31.79	.90
45:15	22.76	2	42.31	77.12	34.15	.90
45:15	22.76	3	40.69	81.46	38.44	.90
46:00	25.79	1	44.03	78.54	32.97	.90
46:00	25.79	2	42.17	77.77	35.13	.90
46:00	25.79	3	41.15	81.69	39.38	.90
47:00	24.38	1	44.12	77.77	32.59	.90
47:00	24.38	2	42.15	78.08	34.78	.90
47:00	24.38	3	40.34	82.27	39.01	.90
48:00	27.34	1	43.79	78.66	33.11	.90
48:00	27.34	2	42.15	78.50	34.99	.90
48:00	27.34	3	40.62	82.50	39.01	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 8
COOLER NUMBER: 3 COOLDOWN TIME: 9

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 14
COOLER NUMBER: 3 COOLDOWN TIME: 14

CYCLE NUMBER: 19 STARTED: 16 Aug 1987 08:28:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	22.94	1	0.00	999.00	999.00	0.00
00:15	22.94	2	0.00	999.00	999.00	0.00
00:15	22.94	3	0.00	999.00	999.00	0.00
01:00	23.01	1	0.00	999.00	999.00	0.00
01:00	23.01	2	0.00	999.00	999.00	0.00
01:00	23.01	3	0.00	999.00	999.00	0.00
02:00	-4.75	1	0.00	999.00	999.00	0.00
02:00	-4.75	2	0.00	999.00	999.00	0.00
02:00	-4.75	3	0.00	999.00	999.00	0.00
03:00	-31.62	1	0.00	999.00	999.00	0.00
03:00	-31.62	2	0.00	999.00	999.00	0.00
03:00	-31.62	3	0.00	999.00	999.00	0.00
04:00	-32.71	1	0.00	999.00	999.00	0.00
04:00	-32.71	2	0.00	999.00	999.00	0.00
04:00	-32.71	3	0.00	999.00	999.00	0.00
05:00	-32.49	1	39.37	62.65	-25.28	.90
05:00	-32.49	2	39.61	68.37	-22.61	.90
05:00	-32.49	3	38.76	70.70	-18.56	.90
06:00	-7.57	1	39.73	67.95	-2.96	.90
06:00	-7.57	2	40.77	74.93	-.98	.90
06:00	-7.57	3	41.02	74.66	3.19	.90
07:00	25.95	1	43.45	72.90	28.39	.90
07:00	25.95	2	42.67	79.69	29.90	.90
07:00	25.95	3	41.29	78.16	33.39	.90
08:00	24.45	1	44.65	73.86	32.56	.90
08:00	24.45	2	42.61	81.46	34.85	.90
08:00	24.45	3	40.88	79.00	39.11	.90
09:00	27.20	1	44.68	74.66	33.32	.90
09:00	27.20	2	41.74	80.96	35.16	.90
09:00	27.20	3	40.76	79.27	39.45	.90
10:00	24.59	1	44.50	75.43	32.77	.90
10:00	24.59	2	41.56	80.62	34.88	.90
10:00	24.59	3	41.40	79.35	39.25	.90
11:00	23.36	1	44.50	75.66	32.35	.90
11:00	23.36	2	41.63	80.19	34.57	.90
11:00	23.36	3	41.66	78.93	39.21	.90

12:00	27.37	1	44.75	75.28	33.32	.90
12:00	27.37	2	42.32	80.08	35.20	.90
12:00	27.37	3	41.83	78.43	39.58	.90
13:00	22.69	1	44.36	75.55	31.86	.90
13:00	22.69	2	42.43	81.27	34.15	.90
13:00	22.69	3	40.94	78.33	38.54	.90
14:00	27.37	1	44.82	74.51	33.32	.90
14:00	27.37	2	42.43	81.15	35.20	.90
14:00	27.37	3	41.13	78.50	39.48	.90
15:00	24.69	1	44.90	74.78	32.83	.90
15:00	24.69	2	42.36	80.85	34.95	.90
15:00	24.69	3	41.67	78.16	39.35	.90
16:00	23.18	1	44.93	74.93	32.24	.90
16:00	23.18	2	42.39	80.92	34.54	.90
16:00	23.18	3	41.45	78.16	38.99	.90
17:00	23.60	1	44.97	75.09	32.52	.90
17:00	23.60	2	42.49	80.92	34.71	.90
17:00	23.60	3	41.22	78.16	39.11	.90
18:00	23.18	1	45.03	75.20	32.31	.90
18:00	23.18	2	42.92	80.04	34.57	.90
18:00	23.18	3	41.17	78.23	39.01	.90
19:15	24.62	1	45.10	75.20	32.80	.90
19:15	24.62	2	42.12	81.23	34.88	.90
19:15	24.62	3	41.20	77.93	39.25	.90
20:00	22.83	1	44.91	75.24	32.04	.90
20:00	22.83	2	42.53	81.23	34.26	.90
20:00	22.83	3	41.25	79.54	38.77	.90
21:00	23.32	1	44.79	75.36	32.31	.90
21:00	23.32	2	42.42	81.54	34.57	.90
21:00	23.32	3	41.97	78.66	39.15	.90
22:00	27.07	1	44.51	76.24	33.36	.90
22:00	27.07	2	42.50	81.35	35.39	.90
22:00	27.07	3	42.20	78.89	39.65	.90
23:00	23.88	1	44.40	76.01	32.52	.90
23:00	23.88	2	42.66	81.38	34.85	.90
23:00	23.88	3	41.57	78.62	39.31	.90
24:00	24.59	1	44.33	75.97	32.70	.90
24:00	24.59	2	42.50	81.93	34.88	.90
24:00	24.59	3	41.79	78.35	39.35	.90
25:00	23.04	1	0.00	999.00	999.00	0.00
25:00	23.04	2	0.00	999.00	999.00	0.00
25:00	23.04	3	0.00	999.00	999.00	0.00

26:00	37.19	1	0.00	999.00	999.00	0.00
26:00	37.19	2	0.00	999.00	999.00	0.00
26:00	37.19	3	0.00	999.00	999.00	0.00
27:00	51.74	1	0.00	999.00	999.00	0.00
27:00	51.74	2	0.00	999.00	999.00	0.00
27:00	51.74	3	0.00	999.00	999.00	0.00
28:00	51.87	1	0.00	999.00	999.00	0.00
28:00	51.87	2	0.00	999.00	999.00	0.00
28:00	51.87	3	0.00	999.00	999.00	0.00
29:00	51.79	1	48.97	78.85	62.49	.90
29:00	51.79	2	47.71	89.51	64.69	.90
29:00	51.79	3	47.44	93.84	69.89	.90
30:00	39.13	1	46.35	77.73	49.55	.90
30:00	39.13	2	45.28	89.32	51.88	.90
30:00	38.13	3	43.37	90.21	56.68	.90
31:00	24.30	1	44.39	74.97	34.26	.90
31:00	24.30	2	42.83	85.08	36.51	.90
31:00	24.30	3	41.48	87.86	41.14	.90
32:00	23.88	1	44.09	74.51	32.73	.90
32:00	23.88	2	42.42	84.50	34.74	.90
32:00	23.88	3	40.82	88.26	39.25	.90
33:00	23.32	1	43.97	74.93	32.45	.90
33:00	23.32	2	42.71	84.81	34.61	.90
33:00	23.32	3	40.45	88.04	39.01	.90
34:00	25.66	1	44.00	74.90	33.08	.90
34:00	25.66	2	42.87	85.00	35.16	.90
34:00	25.66	3	40.84	87.89	39.45	.90
35:00	24.76	1	43.89	75.47	32.90	.90
35:00	24.76	2	42.67	85.46	34.92	.90
35:00	24.76	3	40.70	88.90	39.31	.90
36:00	27.43	1	44.34	74.85	33.77	.90
36:00	27.43	2	42.43	85.57	35.56	.90
36:00	27.43	3	40.81	88.81	39.69	.90
37:00	23.81	1	44.23	75.09	32.73	.90
37:00	23.81	2	42.71	85.15	34.85	.90
37:00	23.81	3	40.97	88.42	39.28	.90
38:00	24.59	1	44.06	75.13	32.90	.90
38:00	24.59	2	42.68	85.69	34.99	.90
38:00	24.59	3	41.95	88.07	39.48	.90
39:00	23.43	1	44.01	75.09	32.42	.90
39:00	23.43	2	42.36	84.54	34.54	.90
39:00	23.43	3	41.07	85.73	39.08	.90

40:00	23.39	1	43.97	75.13	32.42	.90
40:00	23.39	2	42.62	84.31	34.61	.90
40:00	23.39	3	41.17	86.27	39.18	.90
41:00	23.71	1	43.92	75.51	32.49	.90
41:00	23.71	2	42.73	83.77	34.64	.90
41:00	23.71	3	40.96	86.61	39.11	.90
42:00	23.57	1	43.86	75.47	32.49	.90
42:00	23.57	2	42.60	84.88	34.64	.90
42:00	23.57	3	41.17	85.69	39.15	.90
43:00	26.02	1	43.84	75.59	33.22	.90
43:00	26.02	2	42.64	85.23	35.36	.90
43:00	26.02	3	41.76	85.92	39.72	.90
44:00	23.01	1	43.77	75.66	32.17	.90
44:00	23.01	2	42.76	84.58	34.43	.90
44:00	23.01	3	4 51	86.23	38.98	.90
45:00	22.80	1	43.65	75.66	31.93	.90
45:00	22.80	2	42.02	85.31	34.08	.90
45:00	22.80	3	41.38	86.07	38.71	.90
46:00	22.80	1	43.68	75.78	31.93	.90
46:00	22.80	2	42.24	85.81	34.12	.90
46:00	22.80	3	41.71	85.84	38.81	.90
47:00	23.15	1	43.71	75.93	32.21	.90
47:00	23.15	2	42.19	86.07	34.36	.90
47:00	23.15	3	41.85	85.88	39.01	.90
48:00	27.20	1	43.72	75.62	33.36	.90
48:00	27.20	2	42.34	86.15	35.20	.90
48:00	27.20	3	42.22	86.38	39.65	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 9
COOLER NUMBER: 3 COOLDOWN TIME: 10

COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 15
COOLER NUMBER: 3 COOLDOWN TIME: 15

CYCLE NUMBER: 20 STARTED: 18 Aug 1987 08:29:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	23.36	1	0.00	999.00	999.00	0.00
00:15	23.36	2	0.00	999.00	999.00	0.00
00:15	23.36	3	0.00	999.00	999.00	0.00
01:00	22.90	1	0.00	999.00	999.00	0.00
01:00	22.90	2	0.00	999.00	999.00	0.00
01:00	22.90	3	0.00	999.00	999.00	0.00
02:00	-3.87	1	0.00	999.00	999.00	0.00
02:00	-3.87	2	0.00	999.00	999.00	0.00
02:00	-3.87	3	0.00	999.00	999.00	0.00
03:00	-31.21	1	0.00	999.00	999.00	0.00
03:00	-31.21	2	0.00	999.00	999.00	0.00
03:00	-31.21	3	0.00	999.00	999.00	0.00
04:00	-32.79	1	0.00	999.00	999.00	0.00
04:00	-32.79	2	0.00	999.00	999.00	0.00
04:00	-32.79	3	0.00	999.00	999.00	0.00
05:00	-31.92	1	39.69	62.65	-24.72	.90
05:00	-31.92	2	39.25	70.62	-22.46	.90
05:00	-31.92	3	36.31	71.94	-18.97	.90
06:00	-6.98	1	40.08	67.64	-2.26	.90
06:00	-6.98	2	40.11	78.31	-.58	.90
06:00	-6.98	3	38.55	76.16	3.19	.90
07:00	21.96	1	43.45	73.17	27.20	.90
07:00	21.96	2	41.70	80.73	28.85	.90
07:00	21.96	3	39.69	80.08	32.42	.90
08:00	27.07	1	44.19	74.93	33.11	.90
08:00	27.07	2	42.53	81.15	34.88	.90
08:00	27.07	3	40.27	80.69	39.01	.90
09:00	27.24	1	44.33	74.93	33.22	.90
09:00	27.24	2	42.33	80.92	35.02	.90
09:00	27.24	3	40.75	80.85	39.31	.90
10:00	24.02	1	44.26	74.78	32.52	.90
10:00	24.02	2	42.39	80.12	34.61	.90
10:00	24.02	3	41.05	80.65	39.08	.90
11:00	22.73	1	44.23	74.70	31.93	.90
11:00	22.73	2	42.60	80.39	34.19	.90
11:00	22.73	3	41.18	80.73	38.74	.90

12:00	27.47	1	44.23	74.63	33.39	.90
12:00	27.47	2	42.73	79.92	35.16	.90
12:00	27.47	3	41.45	80.58	39.48	.90
13:00	23.15	1	44.32	74.63	32.21	.90
13:00	23.15	2	42.80	80.12	34.43	.90
13:00	23.15	3	41.38	80.69	39.01	.90
14:00	22.87	1	44.25	74.63	31.97	.90
14:00	22.87	2	43.02	79.81	34.22	.90
14:00	22.87	3	41.54	80.50	38.77	.90
15:00	27.40	1	44.39	74.55	33.42	.90
15:00	27.40	2	43.37	79.85	35.50	.90
15:00	27.40	3	41.99	80.65	39.72	.90
16:00	23.85	1	44.27	74.59	32.38	.90
16:00	23.85	2	43.39	80.12	34.67	.90
16:00	23.85	3	41.81	80.77	39.11	.90
17:00	22.87	1	44.22	74.70	31.83	.90
17:00	22.87	2	43.54	79.92	34.22	.90
17:00	22.87	3	42.11	81.00	38.74	.90
18:00	25.82	1	44.19	74.59	33.01	.90
18:00	25.82	2	43.44	79.89	35.06	.90
18:00	25.82	3	42.02	81.12	39.42	.90
19:00	23.46	1	44.18	74.63	32.31	.90
19:00	23.46	2	43.69	79.27	34.61	.90
19:00	23.46	3	41.57	80.62	39.08	.90
20:00	27.37	1	44.16	74.66	33.22	.90
20:00	27.37	2	43.43	80.16	35.09	.90
20:00	27.37	3	41.96	81.15	39.38	.90
21:00	22.73	1	44.11	74.63	31.93	.90
21:00	22.73	2	42.86	80.08	34.22	.90
21:00	22.73	3	41.57	80.77	38.74	.90
22:00	27.20	1	44.19	74.82	33.15	.90
22:00	27.20	2	43.18	80.77	34.99	.90
22:00	27.20	3	41.77	81.97	39.25	.90
23:00	27.50	1	44.19	74.82	33.39	.90
23:00	27.50	2	43.27	81.38	35.43	.90
23:00	27.50	3	41.57	82.16	39.62	.90
24:00	27.34	1	44.16	74.74	33.29	.90
24:00	27.34	2	43.40	81.23	35.13	.90
24:00	27.34	3	42.00	82.96	39.38	.90
25:00	23.36	1	0.00	999.00	999.00	0.00
25:00	23.36	2	0.00	999.00	999.00	0.00
25:00	23.36	3	0.00	999.00	999.00	0.00

26:00	37.32	1	0.00	999.00	999.00	0.00
26:00	37.32	2	0.00	999.00	999.00	0.00
26:00	37.32	3	0.00	999.00	999.00	0.00
27:00	51.74	1	0.00	999.00	999.00	0.00
27:00	51.74	2	0.00	999.00	999.00	0.00
27:00	51.74	3	0.00	999.00	999.00	0.00
28:00	52.24	1	0.00	999.00	999.00	0.00
28:00	52.24	2	0.00	999.00	999.00	0.00
28:00	52.24	3	0.00	999.00	999.00	0.00
29:00	54.94	1	50.69	77.20	63.60	.90
29:00	54.94	2	47.19	91.46	65.09	.90
29:00	54.94	3	44.41	94.25	69.46	.90
30:00	38.37	1	47.61	76.58	49.65	.90
30:00	38.37	2	44.93	91.75	51.65	.90
30:00	38.37	3	42.40	93.04	56.31	.90
31:00	24.48	1	45.07	74.55	34.22	.90
31:00	24.48	2	42.26	88.22	36.27	.90
31:00	24.48	3	41.01	90.39	40.97	.90
32:00	24.66	1	44.68	74.13	32.87	.90
32:00	24.66	2	42.75	88.00	34.85	.90
32:00	24.66	3	41.25	89.84	39.35	.90
33:00	24.97	1	44.65	74.28	32.97	.90
33:00	24.97	2	42.72	88.26	34.88	.90
33:00	24.97	3	41.38	88.63	39.18	.90
34:00	24.30	1	44.72	74.17	32.77	.90
34:00	24.30	2	42.40	88.74	34.74	.90
34:00	24.30	3	41.49	88.55	39.15	.90
35:00	23.25	1	44.51	74.40	32.17	.90
35:00	23.25	2	42.00	90.50	34.12	.90
35:00	23.25	3	41.39	88.59	38.57	.90
36:00	25.76	1	44.56	74.40	32.94	.90
36:00	25.76	2	42.58	89.32	34.85	.90
36:00	25.76	3	42.05	88.15	39.18	.90
37:00	23.43	1	44.55	74.63	32.35	.90
37:00	23.43	2	42.71	89.21	34.43	.90
37:00	23.43	3	41.33	88.33	38.74	.90
38:00	24.55	1	44.38	74.63	32.80	.90
38:00	24.55	2	42.71	89.03	34.85	.90
38:00	24.55	3	41.40	87.67	39.11	.90
39:00	22.97	1	44.40	74.74	32.00	.90
39:00	22.97	2	42.57	88.77	34.12	.90
39:00	22.97	3	41.66	87.89	38.50	.90

40:00	23.78	1	44.71	74.32	32.45	.90
40:00	23.78	2	41.53	90.65	34.29	.90
40:00	23.78	3	41.80	87.67	38.81	.90
41:00	27.73	1	44.62	74.51	33.39	.90
41:00	27.73	2	42.12	88.99	34.99	.90
41:00	27.73	3	41.76	87.45	39.31	.90
42:00	26.02	1	44.46	74.55	33.04	.90
42:00	26.02	2	42.46	88.15	34.92	.90
42:00	26.02	3	41.31	87.19	39.21	.90
43:00	23.57	1	44.48	74.51	32.42	.90
43:00	23.57	2	42.44	87.89	34.43	.90
43:00	23.57	3	41.24	87.75	38.74	.90
44:00	24.83	1	44.49	74.66	32.80	.90
44:00	24.83	2	42.84	87.63	34.74	.90
44:00	24.83	3	41.68	87.52	39.01	.90
45:00	23.53	1	44.38	74.70	32.31	.90
45:00	23.53	2	42.76	87.34	34.36	.90
45:00	23.53	3	41.37	87.60	38.67	.90
46:00	24.20	1	44.27	75.16	32.56	.90
46:00	24.20	2	42.64	87.67	34.57	.90
46:00	24.20	3	41.37	87.41	38.81	.90
47:00	23.25	1	44.49	75.24	32.21	.90
47:00	23.25	2	42.86	87.86	34.26	.90
47:00	23.25	3	41.08	87.78	38.54	.90
48:00	25.99	1	44.47	75.59	33.08	.90
48:00	25.99	2	42.92	87.67	34.95	.90
48:00	25.99	3	41.21	87.45	39.11	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 10
COOLER NUMBER: 3 COOLDOWN TIME: 10

COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 15
COOLER NUMBER: 3 COOLDOWN TIME: 15

CYCLE NUMBER: 21 STARTED: 22 Aug 1987 07:51:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	FINGER TEMP (K)	HOUSING TEMP (C)	HEAT LOAD (W)
00:00	21.61	1	0.00	999.00	999.00	0.00
00:00	21.61	2	0.00	999.00	999.00	0.00
00:00	21.61	3	0.00	999.00	999.00	0.00
01:00	22.94	1	0.00	999.00	999.00	0.00
01:00	22.94	2	0.00	999.00	999.00	0.00
01:00	22.94	3	0.00	999.00	999.00	0.00
02:00	-4.16	1	0.00	999.00	999.00	0.00
02:00	-4.16	2	0.00	999.00	999.00	0.00
02:00	-4.16	3	0.00	999.00	999.00	0.00
03:00	-31.66	1	0.00	999.00	999.00	0.00
03:00	-31.66	2	0.00	999.00	999.00	0.00
03:00	-31.66	3	0.00	999.00	999.00	0.00
04:00	-32.34	1	0.00	999.00	999.00	0.00
04:00	-32.34	2	0.00	999.00	999.00	0.00
04:00	-32.34	3	0.00	999.00	999.00	0.00
05:00	-31.10	1	39.43	64.13	-24.79	.90
05:00	-31.10	2	39.41	71.16	-22.46	.90
05:00	-31.10	3	36.09	69.32	-20.89	.90
06:00	-8.26	1	39.71	69.29	-3.40	.90
06:00	-8.26	2	40.02	78.08	-1.49	.90
06:00	-8.26	3	37.75	73.40	.59	.90
07:00	22.66	1	43.43	74.28	27.43	.90
07:00	22.66	2	42.47	82.39	29.08	.90
07:00	22.66	3	40.54	78.39	31.20	.90
08:00	24.73	1	44.05	76.43	33.04	.90
08:00	24.73	2	43.82	82.93	35.16	.90
08:00	24.73	3	41.77	80.62	37.66	.90
09:00	22.73	1	43.97	76.43	32.45	.90
09:00	22.73	2	44.14	82.04	34.78	.90
09:00	22.73	3	41.92	79.23	37.19	.90
10:00	24.62	1	44.12	76.47	33.18	.90
10:00	24.62	2	44.11	82.81	35.39	.90
10:00	24.62	3	41.25	81.15	37.62	.90
11:00	25.82	1	44.14	76.62	33.42	.90
11:00	25.82	2	43.94	82.16	35.60	.90
11:00	25.82	3	42.02	80.62	37.93	.90

12:00	27.60	1	44.07	76.62	33.74	.90
12:00	27.60	2	43.68	81.38	35.73	.90
12:00	27.60	3	41.65	80.08	38.06	.90
13:00	25.89	1	44.10	76.74	33.49	.90
13:00	25.89	2	44.12	81.27	35.67	.90
13:00	25.89	3	42.25	80.58	38.06	.90
14:00	25.95	1	44.12	76.51	33.49	.90
14:00	25.95	2	43.73	81.77	35.63	.90
14:00	25.95	3	42.40	80.35	38.00	.90
15:00	23.18	1	43.93	76.47	32.49	.90
15:00	23.18	2	43.32	82.31	34.71	.90
15:00	23.18	3	42.42	80.19	37.19	.90
16:00	27.70	1	44.09	76.47	33.91	.90
16:00	27.70	2	43.41	82.04	35.73	.90
16:00	27.70	3	42.31	80.12	38.20	.90
17:00	23.57	1	44.12	76.39	32.80	.90
17:00	23.57	2	43.13	83.04	34.88	.90
17:00	23.57	3	42.34	79.85	37.42	.90
18:00	24.80	1	44.13	76.43	33.18	.90
18:00	24.80	2	43.55	82.08	35.43	.90
18:00	24.80	3	42.26	79.16	37.79	.90
19:00	24.27	1	44.09	76.47	33.15	.90
19:00	24.27	2	43.54	82.31	35.46	.90
19:00	24.27	3	42.32	79.42	37.79	.90
20:00	23.08	1	43.96	76.39	32.42	.90
20:00	23.08	2	43.33	82.35	34.61	.90
20:00	23.08	3	42.31	79.39	37.08	.90
21:15	22.73	1	43.93	76.51	32.31	.90
21:15	22.73	2	43.41	80.65	34.54	.90
21:15	22.73	3	42.19	78.85	36.98	.90
22:00	27.53	1	43.98	76.74	33.77	.90
22:00	27.53	2	43.38	80.39	35.70	.90
22:00	27.53	3	42.23	78.69	38.06	.90
23:00	27.37	1	44.01	76.70	33.77	.90
23:00	27.37	2	43.48	80.62	35.73	.90
23:00	27.37	3	42.43	79.46	36.13	.90
24:00	23.71	1	43.90	76.70	32.87	.90
24:00	23.71	2	43.16	81.77	34.95	.90
24:00	23.71	3	42.31	78.66	37.49	.90
25:00	23.08	1	0.00	999.00	999.00	0.00
25:00	23.08	2	0.00	999.00	999.00	0.00
25:00	23.08	3	0.00	999.00	999.00	0.00

26:00	37.42	1	0.00	999.00	999.00	0.00
26:00	37.42	2	0.00	999.00	999.00	0.00
26:00	37.42	3	0.00	999.00	999.00	0.00
27:00	52.05	1	0.00	999.00	999.00	0.00
27:00	52.05	2	0.00	999.00	999.00	0.00
27:00	52.05	3	0.00	999.00	999.00	0.00
28:00	52.31	1	0.00	999.00	999.00	0.00
28:00	52.31	2	0.00	999.00	999.00	0.00
28:00	52.31	3	0.00	999.00	999.00	0.00
29:00	55.27	1	50.10	81.81	64.30	.90
29:00	55.27	2	46.83	91.60	65.62	.90
29:00	55.27	3	43.71	93.26	68.00	.90
30:00	39.62	1	46.96	80.96	50.80	.90
30:00	39.62	2	44.52	90.57	52.49	.90
30:00	39.62	3	43.52	93.73	54.96	.90
31:00	24.73	1	44.27	79.16	34.88	.90
31:00	24.73	2	43.00	85.57	36.85	.90
31:00	24.73	3	41.49	91.93	39.18	.90
32:00	27.53	1	43.91	79.31	33.84	.90
32:00	27.53	2	42.86	86.38	35.50	.90
32:00	27.53	3	41.65	90.21	37.96	.90
33:00	24.80	1	43.83	79.89	33.25	.90
33:00	24.80	2	43.02	85.57	35.09	.90
33:00	24.80	3	41.31	89.40	37.66	.90
34:00	23.25	1	43.69	80.27	32.80	.90
34:00	23.25	2	42.92	85.69	34.74	.90
34:00	23.25	3	41.44	89.25	37.29	.90
48:00	-4.70	1	40.00	75.70	4.00	.90
48:00	-4.70	2	39.00	78.90	6.00	.90
48:00	-4.70	3	37.50	83.70	9.00	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 10
COOLER NUMBER: 3 COOLDOWN TIME: 10

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 15
COOLER NUMBER: 3 COOLDOWN TIME: 15

CYCLE NUMBER: 22 STARTED: 27 Aug 1987 08:34:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	FINGER TEMP (K)	HOUSING TEMP (C)	HEAT LOAD (W)
00:00	23.67	1	0.00	999.00	999.00	0.00
00:00	23.67	2	0.00	999.00	999.00	0.00
00:00	23.67	3	0.00	999.00	999.00	0.00
01:00	23.81	1	0.00	999.00	999.00	0.00
01:00	23.81	2	0.00	999.00	999.00	0.00
01:00	23.81	3	0.00	999.00	999.00	0.00
02:00	-4.49	1	0.00	999.00	999.00	0.00
02:00	-4.49	2	0.00	999.00	999.00	0.00
02:00	-4.49	3	0.00	999.00	999.00	0.00
03:00	-31.62	1	0.00	999.00	999.00	0.00
03:00	-31.62	2	0.00	999.00	999.00	0.00
03:00	-31.62	3	0.00	999.00	999.00	0.00
04:00	726.00	1	0.00	999.00	999.00	0.00
04:00	726.00	2	0.00	999.00	999.00	0.00
04:00	726.00	3	0.00	999.00	999.00	0.00
05:00	-31.29	1	39.44	64.38	-23.89	.90
05:00	-31.29	2	38.99	69.78	-20.96	.90
05:00	-31.29	3	46.00	68.25	-16.05	.90
06:00	-6.98	1	40.71	68.98	-1.86	.90
06:00	-6.98	2	40.38	73.21	.48	.90
06:00	-6.98	3	38.43	71.73	3.96	.90
07:00	26.81	1	44.48	73.36	29.31	.90
07:00	26.81	2	43.27	78.12	30.92	.90
07:00	26.81	3	41.74	77.50	34.43	.90
08:00	27.43	1	44.93	77.04	35.36	.90
08:00	27.43	2	44.37	78.81	37.90	.90
08:00	27.43	3	43.20	81.23	41.65	.90
09:00	27.63	1	44.99	76.97	35.16	.90
09:00	27.63	2	44.73	78.20	37.86	.90
09:00	27.63	3	42.82	80.73	41.54	.90
10:00	27.70	1	44.86	77.20	35.20	.90
10:00	27.70	2	44.84	78.00	37.86	.90
10:00	27.70	3	42.56	80.19	41.41	.90
11:00	27.53	1	44.92	77.12	35.16	.90
11:00	27.53	2	45.18	77.23	37.90	.90
11:00	27.53	3	42.72	80.19	41.44	.90

12:00	27.60	1	45.15	76.66	35.13	.90
12:00	27.60	2	45.02	77.62	37.79	.90
12:00	27.60	3	42.81	80.39	41.41	.90
13:00	29.08	1	45.03	76.85	35.20	.90
13:00	29.08	2	44.89	77.81	38.03	.90
13:00	29.08	3	43.06	80.65	41.65	.90
14:00	22.90	1	44.90	76.70	33.98	.90
14:00	22.90	2	44.45	79.31	37.25	.90
14:00	22.90	3	42.93	80.31	40.94	.90
15:00	22.55	1	44.90	76.66	33.74	.90
15:00	22.55	2	44.37	79.23	37.05	.90
15:00	22.55	3	42.78	80.69	40.83	.90
16:00	22.76	1	44.76	76.78	33.67	.90
16:00	22.76	2	44.25	79.50	36.88	.90
16:00	22.76	3	42.72	79.54	40.67	.90
17:00	24.16	1	44.60	77.00	34.29	.90
17:00	24.16	2	43.90	79.39	37.42	.90
17:00	24.16	3	42.66	79.96	41.14	.90
18:00	24.87	1	44.57	77.16	34.57	.90
18:00	24.87	2	44.07	79.39	37.56	.90
18:00	24.97	3	42.63	79.92	41.27	.90
19:00	23.64	1	44.49	77.20	34.15	.90
19:00	23.64	2	44.18	79.12	37.35	.90
19:00	23.64	3	42.43	80.08	41.00	.90
20:00	23.11	1	44.56	76.97	34.01	.90
20:00	23.11	2	43.82	79.85	37.25	.90
20:00	23.11	3	42.38	80.39	40.97	.90
21:00	23.53	1	44.67	76.43	34.12	.90
21:00	23.53	2	43.94	80.12	37.25	.90
21:00	23.53	3	42.57	80.62	40.97	.90
22:00	25.66	1	44.57	76.47	34.74	.90
22:00	25.66	2	44.19	79.50	37.66	.90
22:00	25.66	3	42.39	80.58	41.27	.90
23:00	23.01	1	44.51	76.43	33.74	.90
23:00	23.01	2	44.16	79.46	36.92	.90
23:00	23.01	3	42.81	80.69	40.73	.90
24:00	22.76	1	44.63	76.28	33.53	.90
24:00	22.76	2	44.01	79.54	36.71	.90
24:00	22.76	3	42.39	80.73	40.53	.90
25:00	726.00	1	0.00	999.00	999.00	0.00
25:00	726.00	2	0.00	999.00	999.00	0.00
25:00	726.00	3	0.00	999.00	999.00	0.00

26:00	37.52	1	0.00	999.00	999.00	0.00
26:00	37.52	2	0.00	999.00	999.00	0.00
26:00	37.52	3	0.00	999.00	999.00	0.00
27:00	51.78	1	0.00	999.00	999.00	0.00
27:00	51.78	2	0.00	999.00	999.00	0.00
27:00	51.78	3	0.00	999.00	999.00	0.00
28:00	51.86	1	0.00	999.00	999.00	0.00
28:00	51.86	2	0.00	999.00	999.00	0.00
28:00	51.86	3	0.00	999.00	999.00	0.00
29:00	55.58	1	51.17	80.42	65.39	.90
29:00	55.58	2	47.45	89.47	67.75	.90
29:00	55.58	3	45.11	98.73	71.20	.90
30:00	43.98	1	47.47	80.27	52.46	.90
30:00	43.98	2	45.34	88.88	55.13	.90
30:00	43.98	3	43.68	98.69	58.57	.90
31:00	24.41	1	45.55	77.73	36.14	.90
31:00	24.41	2	43.83	85.42	39.18	.90
31:00	24.41	3	41.62	97.89	42.73	.90
32:00	24.94	1	45.07	77.27	34.85	.90
32:00	24.94	2	43.62	84.65	37.66	.90
32:00	24.94	3	40.92	99.06	41.11	.90
33:00	22.73	1	44.88	77.35	33.67	.90
33:00	22.73	2	43.75	84.23	36.85	.90
33:00	22.73	3	40.94	99.54	40.29	.90
34:00	22.76	1	44.91	77.39	33.74	.90
34:00	22.76	2	43.36	84.54	36.85	.90
34:00	22.76	3	40.79	98.55	40.36	.90
35:00	23.64	1	44.99	77.35	34.40	.90
35:00	23.64	2	43.93	81.50	37.42	.90
35:00	23.64	3	40.92	98.47	40.87	.90
36:00	23.88	1	44.85	77.27	34.47	.90
36:00	23.88	2	43.77	81.97	37.49	.90
36:00	23.88	3	41.12	98.47	41.00	.90
37:00	24.02	1	44.76	77.46	34.33	.90
37:00	24.02	2	43.84	80.85	37.32	.90
37:00	24.02	3	40.75	98.14	40.77	.90
38:00	23.18	1	44.73	77.66	33.98	.90
38:00	23.18	2	43.80	81.35	37.19	.90
38:00	23.18	3	41.00	98.03	40.63	.90

39:00	24.27	1	44.77	77.93	34.50	.90
39:00	24.27	2	44.01	81.31	37.56	.90
39:00	24.27	3	40.98	95.86	40.97	.90
40:00	27.63	1	44.89	77.73	35.16	.90
40:00	27.63	2	43.91	81.54	37.83	.90
40:00	27.63	3	41.38	97.92	41.17	.90
41:00	29.18	1	44.66	78.04	35.02	.90
41:00	29.18	2	43.84	81.46	37.83	.90
41:00	29.18	3	41.25	97.41	41.11	.90
42:00	29.28	1	44.71	78.23	35.06	.90
42:00	29.28	2	43.56	81.23	37.83	.90
42:00	29.28	3	40.88	97.04	41.11	.90
43:00	25.79	1	44.69	78.23	34.74	.90
43:00	25.79	2	43.69	81.23	37.59	.90
43:00	25.79	3	40.84	96.67	40.94	.90
44:00	29.11	1	44.58	78.16	34.81	.90
44:00	29.11	2	43.69	81.73	37.59	.90
44:00	29.11	3	40.94	96.97	40.90	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 9
COOLER NUMBER: 2 COOLDOWN TIME: 11
COOLER NUMBER: 3 COOLDOWN TIME: 9

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 14
COOLER NUMBER: 3 COOLDOWN TIME: 15

CYCLE NUMBER: 23 STARTED: 1 Sep 1987 07:57:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:00	22.59	1	0.00	999.00	999.00	0.00
00:00	22.59	2	0.00	999.00	999.00	0.00
00:00	22.59	3	0.00	999.00	999.00	0.00
01:00	23.64	1	0.00	999.00	999.00	0.00
01:00	23.64	2	0.00	999.00	999.00	0.00
01:00	23.64	3	0.00	999.00	999.00	0.00
02:00	-3.73	1	0.00	999.00	999.00	0.00
02:00	-3.73	2	0.00	999.00	999.00	0.00
02:00	-3.73	3	0.00	999.00	999.00	0.00
03:00	-30.95	1	0.00	999.00	999.00	0.00
03:00	-30.95	2	0.00	999.00	999.00	0.00
03:00	-30.95	3	0.00	999.00	999.00	0.00
04:00	-32.41	1	0.00	999.00	999.00	0.00
04:00	-32.41	2	0.00	999.00	999.00	0.00
04:00	-32.41	3	0.00	999.00	999.00	0.00
05:00	-30.69	1	39.69	64.87	-24.23	.90
05:00	-30.69	2	38.58	84.12	-21.68	.90
05:00	-30.69	3	35.83	69.51	-18.75	.90
06:00	-7.68	1	40.59	68.60	-2.59	.90
06:00	-7.68	2	40.62	78.66	-.25	.90
06:00	-7.68	3	38.13	73.55	3.04	.90
07:00	26.05	1	44.71	73.36	29.01	.90
07:00	26.05	2	43.27	81.46	30.72	.90
07:00	26.05	3	43.85	80.77	34.67	.90
08:00	28.72	1	46.02	74.55	35.50	.90
08:00	28.72	2	45.25	84.96	38.17	.90
08:00	28.72	3	44.06	82.96	42.05	.90
09:00	27.53	1	46.05	74.82	35.60	.90
09:00	27.53	2	43.99	89.95	38.03	.90
09:00	27.53	3	43.56	83.19	42.09	.90
10:00	24.41	1	45.81	74.97	34.64	.90
10:00	24.41	2	43.88	92.04	37.52	.90
10:00	24.41	3	43.56	82.27	41.68	.90
11:00	23.04	1	45.71	75.20	34.01	.90
11:00	23.04	2	43.23	92.41	37.15	.90
11:00	23.04	3	43.51	82.85	41.31	.90

12:00	23.95	1	45.77	75.32	34.36	.90
12:00	23.95	2	44.47	91.86	37.46	.90
12:00	23.95	3	43.91	82.20	41.48	.90
13:00	23.57	1	45.89	74.93	34.36	.90
13:00	23.57	2	44.22	91.57	37.52	.90
13:00	23.57	3	43.54	83.20	41.61	.90
14:00	23.57	1	45.96	74.43	35.36	.90
14:00	23.57	2	44.78	91.38	37.86	.90
14:00	23.57	3	43.23	83.62	41.68	.90
15:00	23.92	1	45.87	74.59	34.40	.90
15:00	23.92	2	44.42	90.46	37.52	.90
15:00	23.92	3	43.11	85.11	41.31	.90
16:00	23.29	1	45.96	74.66	34.22	.90
16:00	23.29	2	44.04	90.98	37.46	.90
16:00	23.29	3	42.48	85.75	41.11	.90
17:00	23.04	1	45.71	75.05	34.15	.90
17:00	23.04	2	44.32	89.84	37.39	.90
17:00	23.04	3	42.53	85.77	41.00	.90
18:00	23.15	1	45.92	74.86	34.15	.90
18:00	23.15	2	45.03	89.40	37.39	.90
18:00	23.15	3	42.28	86.19	41.04	.90
19:00	24.63	1	45.69	75.20	34.92	.90
19:00	24.83	2	45.39	88.66	39.00	.90
19:00	24.83	3	42.74	86.34	41.54	.90
20:00	23.10	1	45.57	75.51	33.98	.90
20:00	23.10	2	45.66	88.70	37.42	.90
20:00	23.10	3	42.10	87.08	40.90	.90
21:00	22.83	1	45.56	75.51	34.01	.90
21:00	22.83	2	45.14	89.73	37.29	.90
21:00	22.83	3	42.43	87.63	40.90	.90
22:00	25.66	1	45.52	75.93	34.95	.90
22:00	25.66	2	45.17	89.51	37.93	.90
22:00	25.66	3	42.11	88.44	41.38	.90
23:00	28.95	1	45.50	76.09	34.95	.90
23:00	28.95	2	44.65	89.84	37.60	.90
23:00	28.95	3	41.93	88.66	41.17	.90
24:00	25.01	1	45.57	76.16	33.84	.90
24:00	25.01	2	45.77	89.07	37.46	.90
24:00	25.01	3	41.68	88.99	40.67	.90
25:00	22.69	1	0.00	999.00	999.00	0.00
25:00	22.69	2	0.00	999.00	999.00	0.00
25:00	22.69	3	0.00	999.00	999.00	0.00

26:00	37.49	1	0.00	999.00	999.00	0.00
26:00	37.49	2	0.00	999.00	999.00	0.00
26:00	37.49	3	0.00	999.00	999.00	0.00
27:00	51.39	1	0.00	999.00	999.00	0.00
27:00	51.39	2	0.00	999.00	999.00	0.00
27:00	51.39	3	0.00	999.00	999.00	0.00
28:00	52.10	1	0.00	999.00	999.00	0.00
28:00	52.10	2	0.00	999.00	999.00	0.00
28:00	52.10	3	0.00	999.00	999.00	0.00
29:00	51.71	1	51.51	79.42	64.93	.90
29:00	51.71	2	49.14	86.42	68.01	.90
29:00	51.71	3	44.89	96.86	71.37	.90
30:00	38.00	1	48.29	78.00	51.55	.90
30:00	38.00	2	46.58	84.81	54.65	.90
30:00	38.00	3	43.83	96.56	58.41	.90
31:00	25.86	1	45.95	76.01	37.35	.90
31:00	25.86	2	45.55	82.39	40.43	.90
31:00	25.86	3	41.82	96.56	44.15	.90
32:00	23.39	1	45.48	75.32	34.26	.90
32:00	23.39	2	45.55	81.23	37.56	.90
32:00	23.39	3	41.51	98.18	41.11	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 9
COOLER NUMBER: 2 COOLDOWN TIME: 16
COOLER NUMBER: 3 COOLDOWN TIME: 10

COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 14
COOLER NUMBER: 3 COOLDOWN TIME: 15

CYCLE NUMBER: 24 STARTED: 4 Sep 1987 08:58:00

ELAPSED TIME	CHAMBER TEMP (C)	#	POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	HEAT LOAD (W)
00:00	54.35	1	0.00	999.00	999.00	0.00
00:00	54.35	2	0.00	999.00	999.00	0.00
00:00	54.35	3	0.00	999.00	999.00	0.00
01:00	23.29	1	0.00	999.00	999.00	0.00
01:00	23.29	2	0.00	999.00	999.00	0.00
01:00	23.29	3	0.00	999.00	999.00	0.00
02:00	-4.46	1	0.00	999.00	999.00	0.00
02:00	-4.46	2	0.00	999.00	999.00	0.00
02:00	-4.46	3	0.00	999.00	999.00	0.00
03:00	-31.85	1	0.00	999.00	999.00	0.00
03:00	-31.85	2	0.00	999.00	999.00	0.00
03:00	-31.85	3	0.00	999.00	999.00	0.00
04:00	-32.52	1	0.00	999.00	999.00	0.00
04:00	-32.52	2	0.00	999.00	999.00	0.00
04:00	-32.52	3	0.00	999.00	999.00	0.00
05:00	-35.01	1	40.07	65.57	-24.46	.90
05:00	-35.01	2	39.67	80.46	-21.53	.90
05:00	-35.01	3	35.77	70.51	-18.87	.90
06:00	-7.49	1	40.30	69.67	-2.04	.90
06:00	-7.49	2	42.83	74.40	.48	.90
06:00	-7.49	3	38.08	73.90	3.33	.90
07:00	21.82	1	44.64	74.20	28.65	.90
07:00	21.82	2	45.59	78.54	30.82	.90
07:00	21.82	3	42.16	80.39	33.98	.90
08:00	28.68	1	45.91	75.43	35.70	.90
08:00	28.68	2	47.28	80.62	38.67	.90
08:00	28.68	3	43.16	83.65	41.81	.90
09:00	28.82	1	45.62	77.27	35.67	.90
09:00	28.82	2	47.41	80.00	38.74	.90
09:00	28.82	3	43.12	83.73	41.81	.90
10:00	22.69	1	45.60	77.23	34.47	.90
10:00	22.69	2	46.46	81.00	37.73	.90
10:00	22.69	3	42.41	83.69	41.00	.90
11:00	29.11	1	45.63	76.78	35.67	.90
11:00	29.11	2	46.46	81.38	38.54	.90
11:00	29.11	3	42.70	84.00	41.65	.90

12:00	22.69	1	45.56	76.55	34.33	.90
12:00	22.69	2	45.93	80.89	37.52	.90
12:00	22.69	3	42.63	84.19	40.87	.90
13:00	23.60	1	45.50	76.70	34.85	.90
13:00	23.60	2	45.85	81.15	37.79	.90
13:00	23.60	3	42.57	85.19	41.24	.90
14:00	29.05	1	45.54	76.55	35.46	.90
14:00	29.05	2	46.41	81.08	38.20	.90
14:00	29.05	3	42.57	85.69	41.34	.90
15:00	24.83	1	45.50	76.93	35.46	.90
15:00	24.83	2	46.63	81.65	38.33	.90
15:00	24.83	3	42.33	85.65	41.51	.90
16:00	24.23	1	45.46	76.62	35.16	.90
16:00	24.23	2	46.48	81.77	38.27	.90
16:00	24.23	3	42.36	85.69	41.41	.90
17:00	23.36	1	45.39	76.62	34.78	.90
17:00	23.36	2	46.85	81.27	37.93	.90
17:00	23.36	3	42.31	85.92	41.11	.90
18:00	27.83	1	45.39	76.62	35.87	.90
18:00	27.83	2	46.31	81.12	38.40	.90
18:00	27.83	3	42.31	86.07	41.54	.90
19:00	25.08	1	45.25	76.81	35.56	.90
19:00	25.08	2	46.27	81.65	38.33	.90
19:00	25.08	3	42.36	86.50	41.51	.90
20:00	23.32	1	45.20	76.78	34.64	.90
20:00	23.32	2	46.16	80.92	37.73	.90
20:00	23.32	3	42.12	86.30	40.94	.90
21:00	22.66	1	45.18	76.81	34.40	.90
21:00	22.66	2	45.26	81.46	37.52	.90
21:00	22.66	3	41.96	87.27	40.73	.90
22:00	23.18	1	45.20	76.89	34.57	.90
22:00	23.18	2	46.82	81.77	37.62	.90
22:00	23.18	3	41.77	87.01	40.80	.90
23:00	28.98	1	45.17	76.97	35.67	.90
23:00	28.98	2	46.17	81.77	38.54	.90
23:00	28.98	3	42.02	87.52	41.44	.90
24:00	25.76	1	45.15	77.12	35.50	.90
24:00	25.76	2	46.61	81.58	38.27	.90
24:00	25.76	3	41.94	87.27	41.34	.90
25:00	23.18	1	0.00	999.00	999.00	0.00
25:00	23.18	2	0.00	999.00	999.00	0.00
25:00	23.18	3	0.00	999.00	999.00	0.00

26:00	37.12	1	0.00	999.00	999.00	0.00
26:00	37.12	2	0.00	999.00	999.00	0.00
26:00	37.12	3	0.00	999.00	999.00	0.00
27:00	52.02	1	0.00	999.00	999.00	0.00
27:00	52.02	2	0.00	999.00	999.00	0.00
27:00	52.02	3	0.00	999.00	999.00	0.00
28:00	51.82	1	0.00	999.00	999.00	0.00
28:00	51.82	2	0.00	999.00	999.00	0.00
28:00	51.82	3	0.00	999.00	999.00	0.00
29:00	57.03	1	50.91	80.35	65.67	.90
29:00	57.03	2	50.53	86.57	68.50	.90
29:00	57.03	3	44.59	94.32	71.38	.90
30:00	37.86	1	47.81	81.54	52.02	.90
30:00	37.86	2	47.94	86.94	55.23	.90
30:00	37.86	3	43.34	93.88	58.20	.90
31:00	25.82	1	45.59	78.58	37.79	.90
31:00	25.82	2	45.71	84.50	40.73	.90
31:00	25.82	3	41.94	92.19	44.04	.90
32:00	24.27	1	45.09	78.31	35.02	.90
32:00	24.27	2	46.72	81.73	38.10	.90
32:00	24.27	3	41.65	91.46	41.17	.90
33:00	22.97	1	45.02	78.08	34.47	.90
33:00	22.97	2	46.31	82.31	37.76	.90
33:00	22.97	3	41.68	90.98	40.73	.90
34:00	29.01	1	45.13	78.04	35.60	.90
34:00	29.01	2	46.41	81.85	38.44	.90
34:00	29.01	3	41.74	90.79	41.38	.90
35:00	27.57	1	44.96	77.93	35.83	.90
35:00	27.57	2	45.69	81.77	38.40	.90
35:00	27.57	3	41.91	90.57	41.58	.90
36:00	25.86	1	45.02	78.08	35.50	.90
36:00	25.86	2	46.13	81.69	38.40	.90
36:00	25.86	3	41.88	90.46	41.48	.90
37:00	27.66	1	45.00	78.20	35.73	.90
37:00	27.66	2	45.75	80.65	38.33	.90
37:00	27.66	3	42.14	89.44	41.48	.90
38:00	29.18	1	44.81	78.27	35.50	.90
38:00	29.18	2	46.06	81.69	38.33	.90
38:00	29.18	3	42.58	88.88	41.38	.90
39:00	27.63	1	44.84	78.69	35.60	.90
39:00	27.63	2	46.51	81.62	38.37	.90
39:00	27.63	3	42.49	88.88	41.44	.90

40:00	27.57	1	44.97	78.85	35.63	.90
40:00	27.57	2	46.64	81.50	38.40	.90
40:00	27.57	3	42.24	89.10	41.44	.90
41:00	22.62	1	44.81	78.89	34.43	.90
41:00	22.62	2	46.59	81.27	37.76	.90
41:00	22.62	3	42.32	88.88	40.90	.90
42:00	29.31	1	44.93	78.93	35.73	.90
42:00	29.31	2	46.65	81.35	38.64	.90
42:00	29.31	3	42.17	89.58	41.58	.90
43:00	23.81	1	44.98	78.93	34.88	.90
43:00	23.81	2	46.76	80.00	38.10	.90
43:00	23.81	3	42.05	89.55	41.21	.90
44:00	29.05	1	44.83	79.19	35.56	.90
44:00	29.05	2	46.14	80.12	38.54	.90
44:00	29.05	3	42.21	89.51	41.54	.90
45:00	22.59	1	44.71	79.81	34.43	.90
45:00	22.59	2	46.75	81.27	37.66	.90
45:00	22.59	3	42.11	89.32	40.80	.90
46:00	25.92	1	44.93	79.77	35.43	.90
46:00	25.92	2	46.88	80.92	38.33	.90
46:00	25.92	3	42.34	89.47	41.31	.90
47:00	22.90	1	45.00	79.85	34.64	.90
47:00	22.90	2	47.17	80.23	37.90	.90
47:00	22.90	3	42.27	89.58	40.94	.90
48:00	23.67	1	44.81	80.08	34.81	.90
48:00	23.67	2	47.31	79.73	38.06	.90
48:00	23.67	3	42.36	89.62	41.14	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8
COOLER NUMBER: 2 COOLDOWN TIME: 14
COOLER NUMBER: 3 COOLDOWN TIME: 10

COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12
COOLER NUMBER: 2 COOLDOWN TIME: 14
COOLER NUMBER: 3 COOLDOWN TIME: 15

CYCLE NUMBER: 25 STARTED: 6 Sep 1987 08:59:00

ELAPSED TIME	CHAMBER TEMP (C)	#	POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:15	999.00	1	0.00	999.00	999.00	0.00
00:15	999.00	2	0.00	999.00	999.00	0.00
00:15	999.00	3	0.00	999.00	999.00	0.00
01:00	999.00	1	0.00	999.00	999.00	0.00
01:00	999.00	2	0.00	999.00	999.00	0.00
01:00	999.00	3	0.00	999.00	999.00	0.00
02:00	999.00	1	0.00	999.00	999.00	0.00
02:00	999.00	2	0.00	999.00	999.00	0.00
02:00	999.00	3	0.00	999.00	999.00	0.00
03:00	999.00	1	0.00	999.00	999.00	0.00
03:00	999.00	2	0.00	999.00	999.00	0.00
03:00	999.00	3	0.00	999.00	999.00	0.00
04:00	999.00	1	0.00	999.00	999.00	0.00
04:00	999.00	2	0.00	999.00	999.00	0.00
04:00	999.00	3	0.00	999.00	999.00	0.00
05:00	-32.56	1	40.84	70.39	-27.27	.90
05:00	-32.56	2	0.00	236.64	-32.22	0.00
05:00	-32.56	3	35.97	91.13	-22.91	.90
06:00	-10.49	1	43.20	72.90	-5.52	.90
06:00	-10.49	2	0.00	248.58	-10.93	0.00
06:00	-10.49	3	37.79	90.76	-1.16	.90
07:00	22.45	1	44.93	81.42	26.64	.90
07:00	22.45	2	0.00	272.75	20.59	0.00
07:00	22.45	3	41.66	94.47	31.27	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 7
COOLER NUMBER: 2 COOLDOWN TIME: -7777
COOLER NUMBER: 3 COOLDOWN TIME: -8888

COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: -9999
COOLER NUMBER: 2 COOLDOWN TIME: -9999
COOLER NUMBER: 3 COOLDOWN TIME: -9999

CYCLE NUMBER: 26 STARTED: 30 Nov 1987 11:34:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	FINGER TEMP (K)	HOUSING TEMP (C)	HEAT LOAD (W)
00:00	21.77	1	0.00	999.00	999.00	0.00
00:00	21.77	2	0.00	290.51	999.00	0.00
00:00	21.77	3	0.00	291.14	999.00	0.00
01:00	23.54	1	0.00	293.07	999.00	0.00
01:00	23.54	2	0.00	292.16	999.00	0.00
01:00	23.54	3	0.00	292.75	999.00	0.00
02:00	-4.11	1	0.00	286.10	999.00	0.00
02:00	-4.11	2	0.00	284.97	999.00	0.00
02:00	-4.11	3	0.00	285.57	999.00	0.00
03:00	-31.52	1	0.00	263.86	999.00	0.00
03:00	-31.52	2	0.00	262.80	999.00	0.00
03:00	-31.52	3	0.00	263.50	999.00	0.00
04:00	-32.15	1	0.00	246.82	999.00	0.00
04:00	-32.15	2	0.00	246.06	999.00	0.00
04:00	-32.15	3	0.00	246.70	999.00	0.00
05:00	-31.70	1	39.03	60.21	999.00	.90
05:00	-31.70	2	36.54	78.23	999.00	.90
05:00	-31.70	3	37.49	61.10	999.00	.90
06:00	-13.44	1	40.80	62.00	999.00	.90
06:00	-13.44	2	39.29	72.36	999.00	.90
06:00	-13.44	3	38.20	63.68	999.00	.90
07:00	21.10	1	46.51	68.06	999.00	.90
07:00	21.10	2	43.43	76.89	999.00	.90
07:00	21.10	3	41.22	71.87	999.00	.90
08:00	23.81	1	46.59	69.90	999.00	.90
08:00	23.81	2	43.96	78.31	999.00	.90
08:00	23.81	3	41.82	73.51	999.00	.90
09:00	24.01	1	46.31	70.62	999.00	.90
09:00	24.01	2	44.28	78.16	999.00	.90
09:00	24.01	3	41.64	73.55	999.00	.90
10:00	24.43	1	46.43	70.89	999.00	.90
10:00	24.43	2	43.96	78.08	999.00	.90
10:00	24.43	3	41.73	73.61	999.00	.90
11:00	22.79	1	46.13	71.27	999.00	.90
11:00	22.79	2	43.67	78.04	999.00	.90
11:00	22.79	3	41.54	73.59	999.00	.90

12:00	24.49	1	46.13	71.46	999.00	.90
12:00	24.49	2	43.65	78.23	999.00	.90
12:00	24.49	3	41.66	73.55	999.00	.90
13:00	23.25	1	46.24	71.46	999.00	.90
13:00	23.25	2	43.57	78.08	999.00	.90
13:00	23.25	3	41.59	73.47	999.00	.90
14:00	24.04	1	46.20	71.43	999.00	.90
14:00	24.04	2	43.81	77.56	999.00	.90
14:00	24.04	3	41.70	73.40	999.00	.90
15:00	23.26	1	46.13	71.39	999.00	.90
15:00	23.26	2	43.87	77.46	999.00	.90
15:00	23.26	3	41.47	73.44	999.00	.90
16:00	22.82	1	46.24	71.16	999.00	.90
16:00	22.82	2	43.67	77.20	999.00	.90
16:00	22.82	3	41.39	73.36	999.00	.90
17:00	25.59	1	46.36	71.35	999.00	.90
17:00	25.59	2	43.77	77.00	999.00	.90
17:00	25.59	3	41.36	73.44	999.00	.90
18:00	23.60	1	46.34	71.54	999.00	.90
18:00	23.60	2	43.57	77.12	999.00	.90
18:00	23.60	3	41.51	73.63	999.00	.90
19:00	24.94	1	46.37	71.39	999.00	.90
19:00	24.94	2	43.78	76.89	999.00	.90
19:00	24.94	3	41.45	73.70	999.00	.90
20:00	23.56	1	46.07	71.58	999.00	.90
20:00	23.56	2	43.68	77.20	999.00	.90
20:00	23.56	3	41.38	73.67	999.00	.90
21:00	24.16	1	46.07	71.12	999.00	.90
21:00	24.16	2	43.87	76.81	999.00	.90
21:00	24.16	3	41.23	73.74	999.00	.90
22:00	23.19	1	46.14	71.23	999.00	.90
22:00	23.19	2	44.04	76.51	999.00	.90
22:00	23.19	3	41.21	73.59	999.00	.90
23:00	25.66	1	46.11	71.08	999.00	.90
23:00	25.66	2	44.33	76.24	999.00	.90
23:00	25.66	3	41.42	73.59	999.00	.90
24:00	23.80	1	0.00	71.01	999.00	0.00
24:00	23.80	2	0.00	76.12	999.00	0.00
24:00	23.80	3	0.00	73.40	999.00	0.00
25:00	22.87	1	0.00	250.50	999.00	0.00
25:00	22.87	2	0.00	248.84	999.00	0.00
25:00	22.87	3	0.00	248.84	999.00	0.00

26:00	37.20	1	0.00	289.60	999.00	0.00
26:00	37.20	2	0.00	288.52	999.00	0.00
26:00	37.20	3	0.00	288.83	999.00	0.00
27:00	51.68	1	0.00	308.77	999.00	0.00
27:00	51.68	2	0.00	307.64	999.00	0.00
27:00	51.68	3	0.00	308.43	999.00	0.00
28:00	52.22	1	0.00	318.97	999.00	0.00
28:00	52.22	2	0.00	317.72	999.00	0.00
28:00	52.22	3	0.00	318.53	999.00	0.00
29:00	51.51	1	50.26	77.85	999.00	.61
29:00	51.51	2	47.41	75.62	999.00	.63
29:00	51.51	3	46.12	71.88	999.00	.62
30:00	38.31	1	48.24	76.16	999.00	.63
30:00	38.31	2	46.36	73.59	999.00	.63
30:00	38.31	3	44.17	69.74	999.00	.63
31:00	24.63	1	45.37	79.23	999.00	.90
31:00	24.63	2	44.48	77.73	999.00	.90
31:00	24.63	3	41.66	74.13	999.00	.90
32:00	24.27	1	45.26	77.85	999.00	.90
32:00	24.27	2	44.44	77.20	999.00	.90
32:00	24.27	3	41.70	73.55	999.00	.90
33:00	22.97	1	45.37	77.81	999.00	.90
33:00	22.97	2	44.50	76.85	999.00	.90
33:00	22.97	3	41.28	74.01	999.00	.90
34:00	23.01	1	45.09	77.62	999.00	.90
34:00	23.01	2	44.76	76.66	999.00	.90
34:00	23.01	3	41.36	73.97	999.00	.90
35:00	23.11	1	45.33	77.66	999.00	.90
35:00	23.11	2	45.04	76.66	999.00	.90
35:00	23.11	3	41.09	74.17	999.00	.90
36:00	23.23	1	45.10	77.70	999.00	.90
36:00	23.23	2	44.97	76.55	999.00	.90
36:00	23.23	3	41.03	74.20	999.00	.90
37:00	23.35	1	45.07	77.77	999.00	.90
37:00	23.35	2	44.85	76.35	999.00	.90
37:00	23.35	3	41.09	74.20	999.00	.90
38:00	22.90	1	45.24	77.70	999.00	.90
38:00	22.90	2	45.23	76.05	999.00	.90
38:00	22.90	3	41.00	74.20	999.00	.90
39:00	24.49	1	45.04	77.31	999.00	.90
39:00	24.49	2	45.06	75.93	999.00	.90
39:00	24.49	3	41.07	73.97	999.00	.90

40:00	24.21	1	45.05	77.16	999.00	.90
40:00	24.21	2	45.38	75.66	999.00	.90
40:00	24.21	3	41.00	73.90	999.00	.90
41:00	24.23	1	45.17	76.66	999.00	.90
41:00	24.23	2	45.31	76.12	999.00	.90
41:00	24.23	3	41.01	73.86	999.00	.90
42:00	23.94	1	45.01	77.00	999.00	.90
42:00	23.94	2	45.26	76.01	999.00	.90
42:00	23.94	3	40.83	74.05	999.00	.90
43:00	23.62	1	44.92	76.70	999.00	.90
43:00	23.62	2	45.09	75.97	999.00	.90
43:00	23.62	3	40.92	74.13	999.00	.90
44:00	23.27	1	44.92	76.81	999.00	.90
44:00	23.27	2	45.21	75.93	999.00	.90
44:00	23.27	3	40.87	74.09	999.00	.90
45:00	22.85	1	44.96	76.81	999.00	.90
45:00	22.85	2	45.05	75.74	999.00	.90
45:00	22.85	3	40.89	73.86	999.00	.90
46:00	25.68	1	44.91	76.78	999.00	.90
46:00	25.68	2	45.17	75.74	999.00	.90
46:00	25.68	3	41.26	73.78	999.00	.90
47:00	23.73	1	44.89	76.50	999.00	.90
47:00	23.73	2	44.63	76.51	999.00	.90
47:00	23.73	3	41.27	73.67	999.00	.90
48:00	25.77	1	44.88	76.47	999.00	.90
48:00	25.77	2	45.15	76.20	999.00	.90
48:00	25.77	3	41.22	73.36	999.00	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 8.017
COOLER NUMBER: 2 COOLDOWN TIME: 11.7
COOLER NUMBER: 3 COOLDOWN TIME: 7.7

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 11.6955
COOLER NUMBER: 2 COOLDOWN TIME: 12.5413
COOLER NUMBER: 3 COOLDOWN TIME: 11.942

CYCLE NUMBER: 27 STARTED: 2 Dec 1987 11:35:00

ELAPSED TIME	CHAMBER TEMP (C)	#	POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	HEAT LOAD (W)
00:00	20.74	1	0.00	999.00	999.00	0.00
00:00	20.74	2	0.00	999.00	999.00	0.00
00:00	20.74	3	0.00	999.00	999.00	0.00
01:00	22.78	1	0.00	999.00	999.00	0.00
01:00	22.78	2	0.00	999.00	999.00	0.00
01:00	22.78	3	0.00	999.00	999.00	0.00
02:00	-4.15	1	0.00	999.00	999.00	0.00
02:00	-4.15	2	0.00	999.00	999.00	0.00
02:00	-4.15	3	0.00	999.00	999.00	0.00
03:00	-31.41	1	0.00	999.00	999.00	0.00
03:00	-31.41	2	0.00	999.00	999.00	0.00
03:00	-31.41	3	0.00	999.00	999.00	0.00
04:00	-32.12	1	0.00	999.00	999.00	0.00
04:00	-32.12	2	0.00	999.00	999.00	0.00
04:00	-32.12	3	0.00	999.00	999.00	0.00
05:00	-33.06	1	39.47	60.45	999.00	.90
05:00	-33.06	2	37.07	74.01	999.00	.90
05:00	-33.06	3	37.90	60.90	999.00	.90
06:00	-6.08	1	42.14	62.94	999.00	.90
06:00	-6.08	2	40.83	71.04	999.00	.90
06:00	-6.08	3	38.80	65.98	999.00	.90
07:00	21.38	1	46.28	68.52	999.00	.90
07:00	21.38	2	44.05	75.93	999.00	.90
07:00	21.38	3	41.03	72.74	999.00	.90
08:00	22.77	1	46.09	70.78	999.00	.90
08:00	22.77	2	44.84	77.20	999.00	.90
08:00	22.77	3	41.14	74.59	999.00	.90
09:00	25.47	1	46.12	71.01	999.00	.90
09:00	25.47	2	45.02	76.58	999.00	.90
09:00	25.47	3	41.26	73.97	999.00	.90
10:00	24.47	1	45.86	71.01	999.00	.90
10:00	24.47	2	45.26	76.28	999.00	.90
10:00	24.47	3	41.27	73.40	999.00	.90

11:00	23.27	1	45.84	71.16	999.00	.90
11:00	23.27	2	45.24	75.93	999.00	.90
11:00	23.27	3	41.17	73.21	999.00	.90
12:00	25.41	1	45.63	71.27	999.00	.90
12:00	25.41	2	45.59	76.01	999.00	.90
12:00	25.41	3	41.32	73.01	999.00	.90
13:00	25.00	1	45.66	71.81	999.00	.90
13:00	25.00	2	45.59	76.05	999.00	.90
13:00	25.00	3	41.48	73.24	999.00	.90
14:00	24.57	1	45.50	72.05	999.00	.90
14:00	24.57	2	45.48	76.24	999.00	.90
14:00	24.57	3	41.52	73.01	999.00	.90
15:00	24.50	1	45.55	71.88	999.00	.90
15:00	24.50	2	45.81	76.74	999.00	.90
15:00	24.50	3	41.38	73.13	999.00	.90
16:00	24.60	1	45.43	71.88	999.00	.90
16:00	24.60	2	45.82	76.62	999.00	.90
16:00	24.60	3	41.46	73.28	999.00	.90
17:00	24.68	1	45.44	71.85	999.00	.90
17:00	24.68	2	46.01	76.74	999.00	.90
17:00	24.68	3	41.64	73.17	999.00	.90
18:00	25.04	1	45.33	71.81	999.00	.90
18:00	25.04	2	46.27	76.58	999.00	.90
18:00	25.04	3	41.47	73.05	999.00	.90
19:00	24.09	1	45.41	71.81	999.00	.90
19:00	24.09	2	46.09	76.43	999.00	.90
19:00	24.09	3	41.31	73.09	999.00	.90
20:00	24.00	1	45.37	71.90	999.00	.90
20:00	24.00	2	45.86	76.24	999.00	.90
20:00	24.00	3	41.55	73.17	999.00	.90
21:00	24.16	1	45.43	71.66	999.00	.90
21:00	24.16	2	46.32	75.89	999.00	.90
21:00	24.16	3	41.44	73.17	999.00	.90
22:00	23.81	1	45.39	71.73	999.00	.90
22:00	23.81	2	46.29	76.05	999.00	.90
22:00	23.81	3	41.47	73.17	999.00	.90
23:00	23.53	1	45.44	71.54	999.00	.90
23:00	23.53	2	46.21	75.97	999.00	.90
23:00	23.53	3	41.48	73.09	999.00	.90
24:00	24.40	1	0.00	71.50	999.00	0.00
24:00	24.40	2	0.00	75.97	999.00	0.00
24:00	24.40	3	0.00	73.01	999.00	0.00

25:00	22.93	1	0.00	250.42	999.00	0.00
25:00	22.93	2	0.00	247.83	999.00	0.00
25:00	22.93	3	0.00	248.58	999.00	0.00
26:00	36.89	1	0.00	289.60	999.00	0.00
26:00	36.89	2	0.00	288.27	999.00	0.00
26:00	36.89	3	0.00	288.83	999.00	0.00
27:00	51.41	1	0.00	308.77	999.00	0.00
27:00	51.41	2	0.00	307.57	999.00	0.00
27:00	51.41	3	0.00	308.43	999.00	0.00
28:00	52.12	1	0.00	319.00	999.00	0.00
28:00	52.12	2	0.00	317.69	999.00	0.00
28:00	52.12	3	0.00	318.53	999.00	0.00
29:00	55.23	1	51.06	64.81	999.00	.63
29:00	55.23	2	48.13	74.70	999.00	.63
29:00	55.23	3	44.95	74.63	999.00	.63
30:00	38.48	1	48.10	92.74	999.00	.90
30:00	38.48	2	45.80	79.92	999.00	.90
30:00	38.48	3	42.66	79.58	999.00	.90
31:00	24.88	1	45.06	88.22	999.00	.90
31:00	24.88	2	44.92	76.58	999.00	.90
31:00	24.88	3	41.01	76.55	999.00	.90
32:00	23.76	1	44.56	86.65	999.00	.90
32:00	23.76	2	45.35	75.89	999.00	.90
32:00	23.76	3	40.77	75.82	999.00	.90
33:00	24.97	1	44.26	86.61	999.00	.90
33:00	24.97	2	45.73	74.93	999.00	.90
33:00	24.97	3	40.69	75.82	999.00	.90
34:00	25.17	1	44.52	85.61	999.00	.90
34:00	25.17	2	45.94	74.20	999.00	.90
34:00	25.17	3	41.04	75.47	999.00	.90
35:00	25.01	1	44.18	85.46	999.00	.90
35:00	25.01	2	46.39	74.05	999.00	.90
35:00	25.01	3	41.03	75.59	999.00	.90
36:00	24.47	1	44.17	85.15	999.00	.90
36:00	24.47	2	46.60	73.90	999.00	.90
36:00	24.47	3	41.09	75.01	999.00	.90
37:00	23.05	1	44.00	85.00	999.00	.90
37:00	23.05	2	46.76	73.90	999.00	.90
37:00	23.05	3	41.08	75.16	999.00	.90
38:00	24.63	1	44.29	84.12	999.00	.90
38:00	24.63	2	46.86	74.01	999.00	.90
38:00	24.63	3	41.01	75.28	999.00	.90

39:00	24.60	1	44.36	83.77	999.00	.90
39:00	24.60	2	46.45	74.13	999.00	.90
39:00	24.60	3	41.29	75.20	999.00	.90
40:00	24.54	1	44.52	83.58	999.00	.90
40:00	24.54	2	46.73	74.47	999.00	.90
40:00	24.54	3	41.25	75.20	999.00	.90
41:00	23.79	1	44.47	83.62	999.00	.90
41:00	23.79	2	46.95	74.51	999.00	.90
41:00	23.79	3	41.28	74.82	999.00	.90
42:00	23.61	1	44.44	83.39	999.00	.90
42:00	23.61	2	46.51	74.28	999.00	.90
42:00	23.61	3	41.31	74.86	999.00	.90
43:00	23.37	1	44.31	83.89	999.00	.90
43:00	23.37	2	46.48	75.01	999.00	.90
43:00	23.37	3	41.21	74.90	999.00	.90
44:00	23.19	1	44.26	83.85	999.00	.90
44:00	23.19	2	46.89	74.63	999.00	.90
44:00	23.19	3	41.34	74.97	999.00	.90
45:00	22.99	1	44.31	83.89	999.00	.90
45:00	22.99	2	46.89	74.78	999.00	.90
45:00	22.99	3	41.30	74.90	999.00	.90
46:00	27.03	1	44.36	83.77	999.00	.90
46:00	27.03	2	47.58	74.70	999.00	.90
46:00	27.03	3	41.29	74.86	999.00	.90
47:00	25.69	1	44.40	83.65	999.00	.90
47:00	25.69	2	47.07	74.74	999.00	.90
47:00	25.69	3	41.21	74.93	999.00	.90
48:00	23.36	1	44.41	83.89	999.00	.90
48:00	23.36	2	47.18	74.93	999.00	.90
48:00	23.36	3	41.42	74.97	999.00	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 7.717
COOLER NUMBER: 2 COOLDOWN TIME: 11.017
COOLER NUMBER: 3 COOLDOWN TIME: 7.717

COOLERS ON: ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12.017
COOLER NUMBER: 2 COOLDOWN TIME: 12.367
COOLER NUMBER: 3 COOLDOWN TIME: 12.367

CYCLE NUMBER: 28 STARTED: 7 Dec 1987 11:05:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:00	28.14	1	0.00	999.00	999.00	0.00
00:00	28.14	2	0.00	297.55	999.00	0.00
00:00	28.14	3	0.00	298.01	999.00	0.00
01:00	23.55	1	0.00	295.34	999.00	0.00
01:00	23.55	2	0.00	294.33	999.00	0.00
01:00	23.55	3	0.00	294.89	999.00	0.00
02:00	-4.26	1	0.00	286.69	999.00	0.00
02:00	-4.26	2	0.00	285.50	999.00	0.00
02:00	-4.26	3	0.00	286.13	999.00	0.00
03:00	-31.60	1	0.00	263.93	999.00	0.00
03:00	-31.60	2	0.00	262.80	999.00	0.00
03:00	-31.60	3	0.00	263.57	999.00	0.00
04:00	-32.05	1	0.00	246.78	999.00	0.00
04:00	-32.05	2	0.00	245.99	999.00	0.00
04:00	-32.05	3	0.00	246.74	999.00	0.00
05:00	-31.41	1	40.54	58.17	999.00	.90
05:00	-31.41	2	38.16	69.29	999.00	.90
05:00	-31.41	3	36.98	60.53	999.00	.90
06:00	-6.18	1	42.29	62.45	999.00	.90
06:00	-6.18	2	40.91	69.82	999.00	.90
06:00	-6.18	3	38.66	64.99	999.00	.90
07:00	22.46	1	45.98	68.37	999.00	.90
07:00	22.46	2	43.33	75.47	999.00	.90
07:00	22.46	3	41.21	72.78	999.00	.90
08:00	23.68	1	46.61	69.44	999.00	.90
08:00	23.68	2	43.61	76.74	999.00	.90
08:00	23.68	3	41.41	73.36	999.00	.90
09:00	25.00	1	46.13	69.71	999.00	.90
09:00	25.00	2	43.82	76.28	999.00	.90
09:00	25.00	3	41.67	73.32	999.00	.90
10:00	23.31	1	45.91	69.59	999.00	.90
10:00	23.31	2	43.68	76.66	999.00	.90
10:00	23.31	3	41.55	73.28	999.00	.90
11:00	26.87	1	45.86	69.86	999.00	.90
11:00	26.87	2	43.53	76.81	999.00	.90
11:00	26.87	3	41.73	73.17	999.00	.90

12:00	26.96	1	46.20	70.16	999.00	.90
12:00	26.96	2	43.77	76.78	999.00	.90
12:00	26.96	3	41.55	73.28	999.00	.90
13:00	22.92	1	45.94	70.05	999.00	.90
13:00	22.92	2	43.98	76.70	999.00	.90
13:00	22.92	3	41.38	73.36	999.00	.90
14:00	23.56	1	45.87	70.13	999.00	.90
14:00	23.56	2	43.97	76.43	999.00	.90
14:00	23.56	3	41.72	73.24	999.00	.90
15:00	23.96	1	45.49	70.20	999.00	.90
15:00	23.96	2	44.46	75.93	999.00	.90
15:00	23.96	3	41.48	73.32	999.00	.90
16:00	25.10	1	45.14	70.43	999.00	.90
16:00	25.10	2	44.48	75.97	999.00	.90
16:00	25.10	3	41.64	73.40	999.00	.90
17:00	22.88	1	45.11	70.24	999.00	.90
17:00	22.88	2	44.31	76.09	999.00	.90
17:00	22.88	3	41.71	73.40	999.00	.90
18:00	23.00	1	45.24	70.39	999.00	.90
18:00	23.00	2	44.43	76.05	999.00	.90
18:00	23.00	3	41.46	73.51	999.00	.90
19:00	23.38	1	45.29	70.20	999.00	.90
19:00	23.38	2	44.50	76.55	999.00	.90
19:00	23.38	3	41.70	73.47	999.00	.90
20:00	23.09	1	45.28	70.39	999.00	.90
20:00	23.09	2	45.03	76.28	999.00	.90
20:00	23.09	3	41.67	73.55	999.00	.90
21:00	24.31	1	45.47	70.43	999.00	.90
21:00	24.31	2	44.97	76.09	999.00	.90
21:00	24.31	3	41.75	73.74	999.00	.90
22:00	23.00	1	45.29	70.70	999.00	.90
22:00	23.00	2	45.04	76.24	999.00	.90
22:00	23.00	3	41.63	73.74	999.00	.90
23:00	24.35	1	45.59	70.20	999.00	.90
23:00	24.35	2	45.44	76.05	999.00	.90
23:00	24.35	3	41.80	73.74	999.00	.90
24:00	26.95	1	45.47	70.24	999.00	.90
24:00	26.95	2	45.32	76.12	999.00	.90
24:00	26.95	3	41.81	73.82	999.00	.90
25:00	23.02	1	0.00	249.56	999.00	0.00
25:00	23.02	2	0.00	248.02	999.00	0.00
25:00	23.02	3	0.00	248.54	999.00	0.00

26:00	37.14	1	0.00	289.46	999.00	0.00
26:00	37.14	2	0.00	288.37	999.00	0.00
26:00	37.14	3	0.00	288.87	999.00	0.00
27:00	51.91	1	0.00	308.77	999.00	0.00
27:00	51.91	2	0.00	307.61	999.00	0.00
27:00	51.91	3	0.00	308.46	999.00	0.00
28:00	52.59	1	0.00	318.97	999.00	0.00
28:00	52.59	2	0.00	317.69	999.00	0.00
28:00	52.59	3	0.00	318.50	999.00	0.00
29:00	55.20	1	50.34	70.32	999.00	.63
29:00	55.20	2	47.96	75.28	999.00	.63
29:00	55.20	3	45.45	73.01	999.00	.63
30:00	39.25	1	47.23	74.82	999.00	.90
30:00	39.25	2	45.44	80.54	999.00	.90
30:00	39.25	3	43.25	78.20	999.00	.90
31:00	24.49	1	45.14	71.43	999.00	.90
31:00	24.49	2	44.36	76.93	999.00	.90
31:00	24.49	3	41.15	75.74	999.00	.90
32:00	24.42	1	44.85	70.81	999.00	.90
32:00	24.42	2	44.23	76.12	999.00	.90
32:00	24.42	3	41.53	74.28	999.00	.90
33:00	23.38	1	44.79	70.89	999.00	.90
33:00	23.38	2	44.66	75.70	999.00	.90
33:00	23.38	3	41.37	73.67	999.00	.90
34:00	24.24	1	45.07	70.93	999.00	.90
34:00	24.24	2	45.24	75.36	999.00	.90
34:00	24.24	3	41.44	73.78	999.00	.90
35:00	24.68	1	44.70	71.01	999.00	.90
35:00	24.68	2	45.37	75.39	999.00	.90
35:00	24.68	3	41.68	73.32	999.00	.90
36:00	24.98	1	44.68	71.12	999.00	.90
36:00	24.98	2	45.40	74.93	999.00	.90
36:00	24.98	3	41.62	73.28	999.00	.90
37:00	25.09	1	44.70	71.27	999.00	.90
37:00	25.09	2	45.97	74.93	999.00	.90
37:00	25.09	3	41.66	73.28	999.00	.90
38:00	25.09	1	44.58	71.35	999.00	.90
38:00	25.09	2	45.81	74.86	999.00	.90
38:00	25.09	3	41.78	73.32	999.00	.90
39:00	25.68	1	44.44	71.46	999.00	.90
39:00	25.68	2	46.37	74.78	999.00	.90
39:00	25.68	3	41.59	73.40	999.00	.90

40:00	27.08	1	44.96	71.01	999.00	.90
40:00	27.08	2	46.47	74.63	999.00	.90
40:00	27.08	3	41.87	73.32	999.00	.90
41:00	23.16	1	44.83	71.08	999.00	.90
41:00	23.16	2	46.71	74.36	999.00	.90
41:00	23.16	3	41.53	73.44	999.00	.90
42:00	23.68	1	44.97	71.12	999.00	.90
42:00	23.68	2	46.89	74.36	999.00	.90
42:00	23.68	3	41.80	73.40	999.00	.90
43:00	24.48	1	44.98	71.08	999.00	.90
43:00	24.48	2	46.83	74.17	999.00	.90
43:00	24.48	3	41.68	73.44	999.00	.90
44:00	24.60	1	44.99	71.35	999.00	.90
44:00	24.60	2	46.86	74.32	999.00	.90
44:00	24.60	3	41.73	73.55	999.00	.90
45:00	23.35	1	45.00	71.23	999.00	.90
45:00	23.35	2	47.24	74.13	999.00	.90
45:00	23.35	3	41.88	73.63	999.00	.90
46:00	27.01	1	45.07	71.39	999.00	.90
46:00	27.01	2	46.11	74.63	999.00	.90
46:00	27.01	3	41.91	73.67	999.00	.90
47:00	23.67	1	45.09	71.20	999.00	.90
47:00	23.67	2	46.40	74.90	999.00	.90
47:00	23.67	3	41.88	73.63	999.00	.90
48:00	24.69	1	44.96	71.12	999.00	.90
48:00	24.69	2	47.33	74.28	999.00	.90
48:00	24.69	3	42.04	73.63	999.00	.90

COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER: 1 COOLDOWN TIME: 7.717
COOLER NUMBER: 2 COOLDOWN TIME: 10.383
COOLER NUMBER: 3 COOLDOWN TIME: 7.717

COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER: 1 COOLDOWN TIME: 12.017
COOLER NUMBER: 2 COOLDOWN TIME: 12.367
COOLER NUMBER: 3 COOLDOWN TIME: 12.367

CYCLE NUMBER: 29 STARTED: 14 Dec 1987 14:58:00

ELAPSED TIME	CHAMBER TEMP (C)	#	COOLER POWER (W)	COOLER FINGER TEMP (K)	COOLER HOUSING TEMP (C)	COOLER HEAT LOAD (W)
00:00	26.13	1	0.00	999.00	999.00	0.00
00:00	26.13	2	0.00	294.40	999.00	0.00
00:00	26.13	3	0.00	295.06	999.00	0.00
01:00	23.12	1	0.00	294.22	999.00	0.00
01:00	23.12	2	0.00	293.24	999.00	0.00
01:00	23.12	3	0.00	293.84	999.00	0.00
02:00	-4.31	1	0.00	285.85	999.00	0.00
02:00	-4.31	2	0.00	284.97	999.00	0.00
02:00	-4.31	3	0.00	285.82	999.00	0.00
03:00	-31.74	1	0.00	262.65	999.00	0.00
03:00	-31.74	2	0.00	261.12	999.00	0.00
03:00	-31.74	3	0.00	263.24	999.00	0.00
04:00	-32.09	1	0.00	245.91	999.00	0.00
04:00	-32.09	2	0.00	244.26	999.00	0.00
04:00	-32.09	3	0.00	246.25	999.00	0.00
05:00	-31.91	1	40.32	58.58	999.00	.90
05:00	-31.91	2	27.66	168.68	999.00	.90
05:00	-31.91	3	37.03	61.47	999.00	.90
06:00	-6.70	1	42.04	63.64	999.00	.90
06:00	-6.70	2	29.23	136.70	999.00	.90
06:00	-6.70	3	38.52	65.61	999.00	.90
07:00	23.78	1	45.99	69.90	999.00	.90
07:00	23.78	2	31.43	133.13	999.00	.90
07:00	23.78	3	41.23	72.48	999.00	.90
08:00	22.89	1	46.32	70.62	999.00	.90
08:00	22.89	2	31.65	136.91	999.00	.90
08:00	22.89	3	41.40	74.43	999.00	.90
09:00	23.05	1	46.17	70.55	999.00	.90
09:00	23.05	2	31.71	137.63	999.00	.90
09:00	23.05	3	41.34	74.66	999.00	.90
10:00	25.10	1	46.05	70.74	999.00	.90
10:00	25.10	2	31.55	137.88	999.00	.90
10:00	25.10	3	41.43	74.74	999.00	.90
11:00	25.05	1	45.93	70.89	999.00	.90
11:00	25.05	2	31.76	137.99	999.00	.90
11:00	25.05	3	41.28	74.78	999.00	.90

12:00	22.86	1	45.86	70.74	999.00	.90
12:00	22.86	2	31.94	137.95	999.00	.90
12:00	22.86	3	41.30	75.05	999.00	.90
13:00	23.21	1	45.81	70.55	999.00	.90
13:00	23.21	2	31.90	138.06	999.00	.90
13:00	23.21	3	41.32	75.05	999.00	.90
14:00	23.21	1	45.83	70.55	999.00	.90
14:00	23.21	2	31.70	138.06	999.00	.90
14:00	23.21	3	41.48	75.01	999.00	.90
15:00	22.88	1	45.71	70.47	999.00	.90
15:00	22.88	2	31.98	137.88	999.00	.90
15:00	22.88	3	41.59	75.09	999.00	.90
16:00	25.16	1	45.74	70.43	999.00	.90
16:00	25.16	2	31.94	137.99	999.00	.90
16:00	25.16	3	41.68	74.90	999.00	.90
17:00	23.24	1	45.48	70.43	999.00	.90
17:00	23.24	2	31.82	138.20	999.00	.90
17:00	23.24	3	41.41	75.20	999.00	.90
18:00	24.60	1	45.60	70.36	999.00	.90
18:00	24.60	2	32.02	138.34	999.00	.90
18:00	24.60	3	41.62	74.97	999.00	.90
19:00	22.88	1	45.50	70.58	999.00	.90
19:00	22.88	2	32.22	138.09	999.00	.90
19:00	22.88	3	41.71	74.97	999.00	.90
20:00	23.31	1	45.49	70.43	999.00	.90
20:00	23.31	2	32.17	137.91	999.00	.90
20:00	23.31	3	41.54	75.36	999.00	.90
21:00	22.88	1	45.41	70.32	999.00	.90
21:00	22.88	2	32.21	137.74	999.00	.90
21:00	22.88	3	41.41	75.24	999.00	.90
22:00	23.25	1	45.36	70.24	999.00	.90
22:00	23.25	2	32.24	137.77	999.00	.90
22:00	23.25	3	41.42	75.24	999.00	.90
23:00	23.57	1	45.52	70.43	999.00	.90
23:00	23.57	2	32.52	137.70	999.00	.90
23:00	23.57	3	41.67	75.28	999.00	.90
24:00	23.78	1	45.48	70.32	999.00	.90
24:00	23.78	2	32.67	137.52	999.00	.90
24:00	23.78	3	41.58	75.32	999.00	.90
25:00	23.16	1	0.00	251.17	999.00	0.00
25:00	23.16	2	0.00	261.08	999.00	0.00
25:00	23.16	3	0.00	249.82	999.00	0.00

26:00	37.23	1	0.00	290.23	999.00	0.00
26:00	37.23	2	0.00	291.25	999.00	0.00
26:00	37.23	3	0.00	289.25	999.00	0.00
27:00	51.64	1	0.00	309.64	999.00	0.00
27:00	51.64	2	0.00	308.80	999.00	0.00
27:00	51.64	3	0.00	308.90	999.00	0.00
28:00	52.09	1	0.00	319.71	999.00	0.00
28:00	52.09	2	0.00	318.36	999.00	0.00
28:00	52.09	3	0.00	318.97	999.00	0.00
29:00	53.17	1	49.80	72.13	999.00	.63
29:00	53.17	2	34.45	130.16	999.00	.63
29:00	53.17	3	44.92	74.70	999.00	.63
30:00	39.55	1	47.14	77.20	999.00	.90
30:00	39.55	2	32.96	144.20	999.00	.90
30:00	39.55	3	42.41	80.00	999.00	.90
31:00	25.26	1	44.82	74.24	999.00	.90
31:00	25.26	2	31.63	139.59	999.00	.90
31:00	25.26	3	41.15	77.31	999.00	.90
32:00	23.49	1	44.22	73.24	999.00	.90
32:00	23.49	2	31.50	136.84	999.00	.90
32:00	23.49	3	41.15	75.09	999.00	.90
33:00	23.06	1	44.16	73.01	999.00	.90
33:00	23.06	2	31.39	136.77	999.00	.90
33:00	23.06	3	41.15	75.59	999.00	.90
34:00	23.98	1	44.16	73.05	999.00	.90
34:00	23.98	2	31.65	136.45	999.00	.90
34:00	23.98	3	41.86	74.93	999.00	.90
35:00	25.00	1	43.84	72.98	999.00	.90
35:00	25.00	2	31.84	136.59	999.00	.90
35:00	25.00	3	41.64	74.70	999.00	.90
36:00	23.39	1	43.91	73.01	999.00	.90
36:00	23.39	2	31.78	136.70	999.00	.90
36:00	23.39	3	41.62	74.86	999.00	.90
37:00	24.09	1	44.23	72.90	999.00	.90
37:00	24.09	2	32.04	136.45	999.00	.90
37:00	24.09	3	41.70	75.01	999.00	.90
38:00	24.93	1	44.30	72.82	999.00	.90
38:00	24.93	2	31.96	136.41	999.00	.90
38:00	24.93	3	41.52	74.90	999.00	.90
39:00	25.00	1	44.14	72.98	999.00	.90
39:00	25.00	2	32.28	136.56	999.00	.90
39:00	25.00	3	41.24	74.93	999.00	.90

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40:00    22.85    1    44.04    73.21    999.00    .90
40:00    22.85    2    32.36   136.59    999.00    .90
40:00    22.85    3    41.17    74.93    999.00    .90

41:00    24.07    1    44.16    73.13    999.00    .90
41:00    24.07    2    32.32   136.41    999.00    .90
41:00    24.07    3    41.43    74.93    999.00    .90

42:00    25.04    1    44.18    73.21    999.00    .90
42:00    25.04    2    32.49   136.49    999.00    .90
42:00    25.04    3    41.59    74.74    999.00    .90

43:00    23.40    1    44.20    73.44    999.00    .90
43:00    23.40    2    32.54   136.56    999.00    .90
43:00    23.40    3    41.43    76.85    999.00    .90

-----------------------------------------------------------
COOLERS ON: ELAPSED TIME = 4:00

COOLER NUMBER:  1  COOLDOWN TIME:  7.7
COOLER NUMBER:  2  COOLDOWN TIME:  8888
COOLER NUMBER:  3  COOLDOWN TIME:  7.7

-----------------------------------------------------------
COOLERS ON; ELAPSED TIME = 28:00

COOLER NUMBER:  1  COOLDOWN TIME:  12.017
COOLER NUMBER:  2  COOLDOWN TIME:  8888
COOLER NUMBER:  3  COOLDOWN TIME:  12.7
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NVFOL CRYOGENIC COOLER LAB

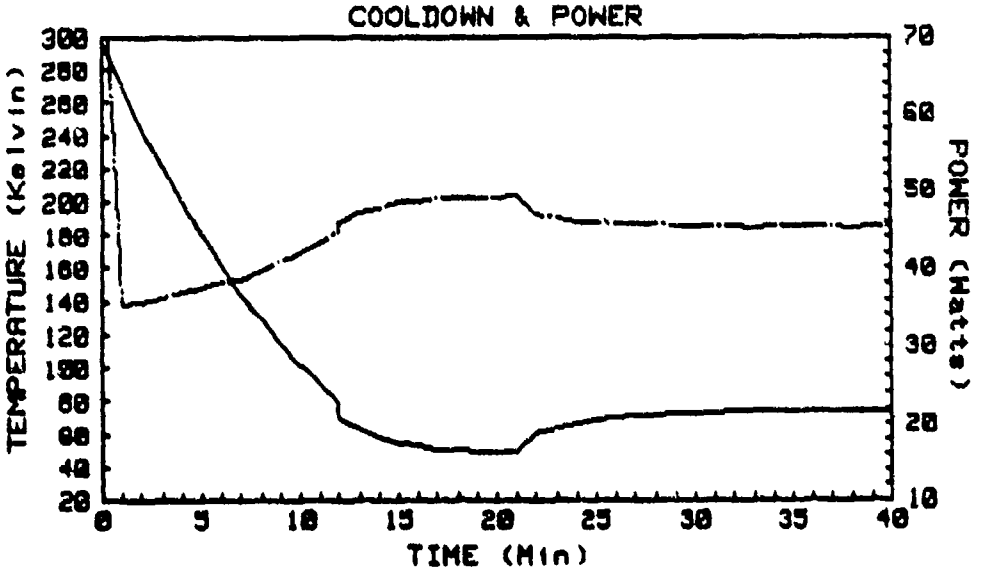
CRYOGENIC COOLER DATA

COOLER: CTI C7171-1
VOLTAGE: 117
AMBIENT:

DATE: 18 FEB 88 09:22
ENGR: HLD
PROG: CATP* 1.0

TEST: BASELINE TEST FOLLOWING RELIABILITY TEST

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	85.11	.001	296.82	0.000
1.00	35.38	.001	270.13	0.000
2.00	35.54	.001	244.86	0.000
3.00	36.04	.001	221.55	0.000
4.00	36.88	.001	200.40	0.000
5.00	37.44	.001	180.50	0.000
6.00	38.33	.001	162.14	0.000
7.00	38.66	.001	145.12	0.000
8.00	39.68	.001	129.76	0.000
9.00	40.85	.001	114.79	0.000
10.00	42.00	.001	101.64	0.000
10.15	42.18	.001	99.95	0.000
11.00	43.23	.001	89.92	0.000
11.97	44.87	.001	79.17	0.000
12.00	45.82	.001	70.68	0.000
13.00	47.36	.001	63.65	0.000
14.00	47.87	.001	58.56	0.000
15.00	48.67	.001	55.12	0.000
16.00	48.49	.001	52.69	0.000
17.00	49.07	.001	51.34	0.000
18.00	49.00	.001	50.29	0.000
19.00	49.20	.001	49.64	0.000
20.00	49.10	.001	49.33	0.000
30.00	45.44	.001	73.22	1.001
40.00	45.36	.001	74.57	1.001



NVEOL CRYOGENIC COOLER LAB

CRYOGENIC COOLER DATA

COOLER: CTI C7171-1
VOLTAGE: 117
AMBIENT:

DATE: 18 FEB 88 09:23
ENGR: HLD
PROG: CATP* 1.0

TEST: BASELINE TEST FOLLOWING RELIABILITY TEST

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	85.11	.001	296.82	0.000
1.00	35.38	.001	270.13	0.000
2.00	35.54	.001	244.86	0.000
3.00	36.04	.001	221.55	0.000
4.00	36.88	.001	200.40	0.000
5.00	37.44	.001	180.50	0.000
6.00	38.33	.001	162.14	0.000
7.00	38.66	.001	145.12	0.000
8.00	39.68	.001	129.76	0.000
9.00	40.85	.001	114.79	0.000
10.00	42.00	.001	101.64	0.000
10.15	42.18	.001	99.95	0.000
11.00	43.23	.001	89.92	0.000
11.97	44.87	.001	79.17	0.000
12.00	45.82	.001	70.68	0.000
13.00	47.36	.001	63.65	0.000
14.00	47.87	.001	58.56	0.000
15.00	48.67	.001	55.12	0.000
16.00	48.49	.001	52.69	0.000
17.00	49.07	.001	51.34	0.000
18.00	49.00	.001	50.29	0.000
19.00	49.20	.001	49.64	0.000
20.00	49.10	.001	49.33	0.000
21.00	49.33	.001	49.12	0.000
22.00	46.99	.001	60.35	1.001
23.00	46.39	.001	64.68	1.001
24.00	45.96	.001	67.30	1.001
25.00	45.85	.001	69.38	1.001
26.00	45.79	.001	70.68	1.001
27.00	45.59	.001	71.60	1.001
28.00	45.74	.001	72.25	1.001
29.00	45.32	.001	72.80	1.001
30.00	45.44	.001	73.22	1.001
31.00	45.38	.001	73.49	1.001
32.00	45.45	.001	73.72	1.001
33.00	45.11	.001	73.91	1.001
34.00	45.33	.001	74.11	1.001
35.00	45.44	.001	74.22	1.001
36.00	45.35	.001	74.30	1.001
37.00	45.54	.001	74.37	1.001
38.00	45.22	.001	74.45	1.001
39.00	45.54	.001	74.53	1.001
40.00	45.36	.001	74.57	1.001
41.00	45.31	.001	74.64	1.001

NVEOL CRYOGENIC COOLER LAB

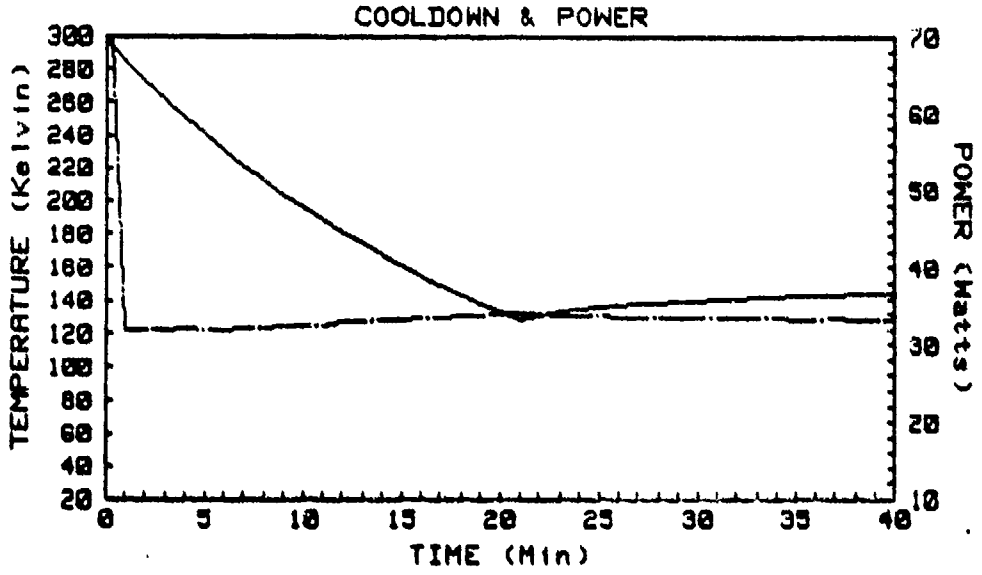
CRYOGENIC COOLER DATA

COOLER: CTI C7173-1
VOLTAGE: 117
AMBIENT:

DATE: 17 FEB 88 15:19
ENGR: HLD
PROG: CATP* 1.0

TEST: BASELINE TEST FOLLOWING RELIABILITY TEST

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	86.15	.001	298.01	0.000
1.00	31.99	.001	285.29	0.000
2.00	31.99	.001	272.83	0.000
3.00	31.97	.001	261.46	0.000
4.00	32.14	.001	250.61	0.000
5.00	31.93	.001	240.40	0.000
6.00	31.98	.001	231.02	0.000
7.00	32.13	.001	221.62	0.000
8.00	32.26	.001	212.74	0.000
9.00	32.41	.001	204.17	0.000
10.00	32.48	.001	196.08	0.000
11.00	32.54	.001	188.38	0.000
12.00	32.91	.001	181.06	0.000
13.00	33.09	.001	174.16	0.000
14.00	33.20	.001	167.50	0.000
15.00	33.30	.001	160.95	0.000
16.00	33.43	.001	154.84	0.000
17.00	33.59	.001	149.09	0.000
18.00	33.66	.001	143.51	0.000
19.00	33.84	.001	138.41	0.000
20.00	33.96	.001	133.58	0.000
30.00	33.49	.001	140.16	1.002
40.00	33.33	.001	144.77	1.002



NVEOL CRYOGENIC COOLER LAB

CRYOGENIC COOLER DATA

COOLER: CTI C7173-1
VOLTAGE: 117
AMBIENT:

DATE: 17 FEB 88 15:20
ENGR: HLD
PROG: CATP* 1.0

TEST: BASELINE TEST FOLLOWING RELIABILITY TEST

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	86.15	.001	298.01	0.000
1.00	31.99	.001	285.29	0.000
2.00	31.99	.001	272.83	0.000
3.00	31.97	.001	261.46	0.000
4.00	32.14	.001	250.61	0.000
5.00	31.93	.001	240.40	0.000
6.00	31.98	.001	231.02	0.000
7.00	32.13	.001	221.62	0.000
8.00	32.26	.001	212.74	0.000
9.00	32.41	.001	204.17	0.000
10.00	32.48	.001	196.08	0.000
11.00	32.54	.001	188.38	0.000
12.00	32.91	.001	181.06	0.000
13.00	33.09	.001	174.16	0.000
14.00	33.20	.001	167.50	0.000
15.00	33.30	.001	160.95	0.000
16.00	33.43	.001	154.84	0.000
17.00	33.59	.001	149.09	0.000
18.00	33.66	.001	143.51	0.000
19.00	33.84	.001	138.41	0.000
20.00	33.96	.001	133.58	0.000
21.00	34.01	.001	129.01	0.000
22.00	34.00	.001	131.05	1.002
23.00	33.90	.001	133.01	1.002
24.00	33.82	.001	134.51	1.002
25.00	33.76	.001	135.80	1.002
26.00	33.64	.001	136.87	1.002
27.00	33.61	.001	137.83	1.002
28.00	33.60	.001	138.68	1.002
29.00	33.52	.001	139.44	1.002
30.00	33.49	.001	140.16	1.002
31.00	33.50	.001	140.80	1.002
32.00	33.42	.001	141.37	1.002
33.00	33.45	.001	141.91	1.002
34.00	33.44	.001	142.41	1.002
35.00	33.37	.001	142.87	1.002
36.00	33.38	.001	143.30	1.002
37.00	33.43	.001	143.73	1.002
38.00	33.36	.001	144.09	1.002
39.00	33.35	.001	144.44	1.002
40.00	33.33	.001	144.77	1.002
41.00	33.27	.001	145.05	1.002

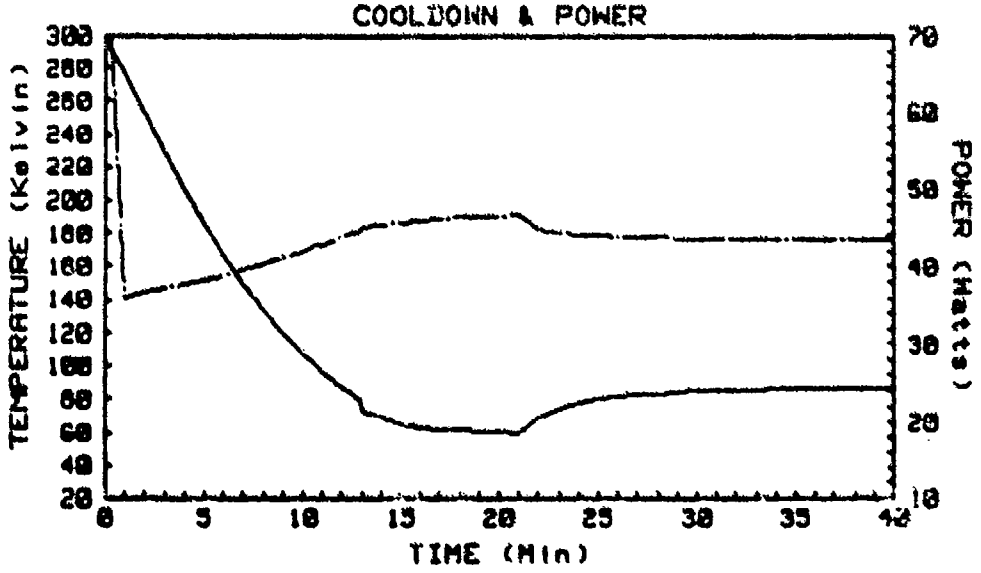
CRYOGENIC COOLER DATA

COOLER: CTI C7175-1
VOLTAGE: 117
AMBIENT:

DATE: 18 FEB 88 14:39
ENGR: HLD
PROG: CATP* 1.0

TEST: BASELINE TEST FOLLOWING RELIABILITY TEST

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	87.36	.001	297.58	0.000
1.00	36.00	.001	277.43	0.000
2.00	36.61	.001	252.59	0.000
3.00	37.11	.001	228.05	0.000
4.00	37.64	.001	205.73	0.000
5.00	38.24	.001	185.17	0.000
6.00	38.87	.001	166.63	0.000
7.00	39.64	.001	149.30	0.000
8.00	40.43	.001	133.83	0.000
9.00	41.18	.001	119.83	0.000
10.00	42.05	.001	107.56	0.000
10.70	42.66	.001	99.96	0.000
11.00	42.87	.001	96.62	0.000
12.00	43.82	.001	87.40	0.000
12.97	44.50	.001	79.32	0.000
13.00	45.15	.001	73.33	0.000
14.00	45.54	.001	68.97	0.000
15.00	45.81	.001	65.88	0.000
16.00	46.05	.001	63.31	0.000
17.00	46.22	.001	62.24	0.000
18.00	46.37	.001	61.34	0.000
19.00	46.44	.001	60.64	0.000
20.00	46.52	.001	60.19	0.000
30.00	43.63	.001	94.86	.996
40.00	43.46	.001	86.91	.996



NVEOL CRYOGENIC COOLER LAB

CRYOGENIC COOLER DATA

COOLER: CTI C7175-1
VOLTAGE: 117
AMBIENT:

DATE: 18 FEB 88 14:40
ENGR: HLD
PROG: CATP* 1.0

TEST: BASELINE TEST FOLLOWING RELIABILITY TEST

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	87.36	.001	297.58	0.000
1.00	36.00	.001	277.43	0.000
2.00	36.61	.001	252.59	0.000
3.00	37.11	.001	228.05	0.000
4.00	37.64	.001	205.73	0.000
5.00	38.24	.001	185.17	0.000
6.00	38.87	.001	166.63	0.000
7.00	39.64	.001	149.30	0.000
8.00	40.43	.001	133.83	0.000
9.00	41.18	.001	119.83	0.000
10.00	42.05	.001	107.56	0.000
10.70	42.66	.001	99.96	0.000
11.00	42.87	.001	96.62	0.000
12.00	43.82	.001	87.40	0.000
12.97	44.50	.001	79.32	0.000
13.00	45.15	.001	73.33	0.000
14.00	45.54	.001	68.97	0.000
15.00	45.81	.001	65.88	0.000
16.00	46.05	.001	63.31	0.000
17.00	46.22	.001	62.24	0.000
18.00	46.37	.001	61.34	0.000
19.00	46.44	.001	60.64	0.000
20.00	46.52	.001	60.19	0.000
21.00	46.64	.001	59.90	0.000
22.00	44.96	.001	69.17	.996
23.00	44.47	.001	74.59	.996
24.00	44.19	.001	77.78	.996
25.00	44.06	.001	79.86	.996
26.00	43.86	.001	81.43	.996
27.00	43.81	.001	82.59	.996
28.00	43.75	.001	83.47	.996
29.00	43.69	.001	84.12	.996
30.00	43.63	.001	84.86	.996
31.00	43.57	.001	85.26	.996
32.00	43.62	.001	85.60	.996
33.00	43.54	.001	85.93	.996
34.00	43.50	.001	86.15	.996
35.00	43.60	.001	86.37	.996
36.00	43.51	.001	86.51	.996
37.00	43.56	.001	86.62	.996
38.00	43.52	.001	86.70	.996
39.00	43.53	.001	86.77	.996
40.00	43.46	.001	86.81	.996
41.00	43.38	.001	86.88	.996

CRYOGENIC COOLER DATA

COOLER: CTI 7171 DATE: 25 FEB 88 25:11:55
VOLTAGE: 117 ENGR: R.N. SAMUELS

TEST: ADD'L 12 HR RUN TO OBTAIN 1000 HRS TOTAL RUN TIME

ELAPSED TIME	POWER (W)	COOLER FINGER TEMP (K)	HEAT LOAD (W)
00:00:00	0.00	295.75	0.00
0:0:0	85.09	295.40	0.00
0:10:18	43.38	100.04	0.00
0:12:37	46.24	80.05	0.00
0:14:56	48.40	66.22	0.00
0:29:55	46.40	79.01	.88
0:44:56	45.74	79.94	.88
0:59:56	45.90	79.97	.88
1:14:56	45.69	79.97	.88
1:29:56	45.40	80.01	.88
1:44:56	45.55	80.17	.88
1:59:56	45.61	80.13	.88
2:14:56	45.56	80.13	.88
2:29:57	45.51	80.09	.88
2:44:56	45.42	80.05	.88
2:59:56	45.42	80.01	.88
3:14:55	45.41	79.90	.88
3:29:57	45.42	79.90	.88
3:44:57	45.33	79.94	.88
3:59:57	45.36	80.01	.88
4:14:56	45.24	80.01	.88
4:29:56	45.29	79.97	.88
4:44:56	45.29	79.86	.88
4:59:57	45.25	79.90	.88
5:14:56	45.17	79.82	.88
5:29:55	45.26	79.82	.88
5:44:56	45.29	79.86	.88
5:59:56	45.39	80.05	.88
6:14:56	45.50	80.28	.88
6:29:56	45.47	80.47	.88
6:44:55	45.59	80.43	.88
6:59:55	45.48	80.36	.88
7:14:56	45.46	80.37	.88
7:29:55	45.36	80.67	.88
7:44:56	45.45	80.63	.88
7:59:55	45.34	80.70	.88
8:14:56	45.26	80.59	.88
8:29:55	45.27	80.36	.88
8:44:56	45.22	80.63	.88
8:59:56	45.21	80.55	.88
9:14:56	45.19	80.63	.88
9:29:57	45.19	80.51	.88

9:59:56	45.23	80.63	.88
10:14:56	45.24	80.59	.88
10:29:56	45.34	80.51	.88
10:44:57	45.20	80.51	.88
10:59:56	45.16	80.47	.88
11:14:56	45.14	80.47	.88
11:29:56	45.21	80.51	.88
11:44:56	45.11	80.43	.88
11:59:56	45.03	80.47	.88
12:14:56	45.14	80.20	.88
12:29:56	45.10	80.36	.88
12:44:56	44.99	80.40	.88
12:59:56	45.07	80.47	.88
13:14:56	45.02	80.40	.88
13:29:56	45.08	80.43	.88
13:44:57	45.08	80.51	.88
13:59:56	45.03	80.51	.88
14:14:56	45.02	80.47	.88
14:29:56	45.02	80.40	.88
14:44:56	44.84	80.47	.88
14:59:56	44.97	80.40	.88
15:14:56	44.75	80.36	.88
15:29:56	44.80	80.32	.88
15:44:55	44.76	80.40	.88
15:59:56	44.72	80.43	.88
16:14:56	44.66	80.43	.88
16:29:57	44.76	80.47	.88
16:44:56	44.76	80.47	.88
16:59:56	44.76	80.47	.88
17:14:55	44.67	80.55	.88
17:29:56	44.68	80.59	.88
17:44:56	44.76	80.55	.88
17:59:56	44.71	80.51	.88
18:14:56	44.76	80.55	.88
18:29:56	44.75	80.47	.88
18:44:56	44.74	80.55	.88
18:59:57	44.72	80.59	.88
19:14:57	44.70	80.51	.88
19:29:56	44.72	80.51	.88
19:44:56	44.69	80.55	.89
19:59:56	44.62	80.63	.88

NUFOL CRYOGENIC COOLER LAB

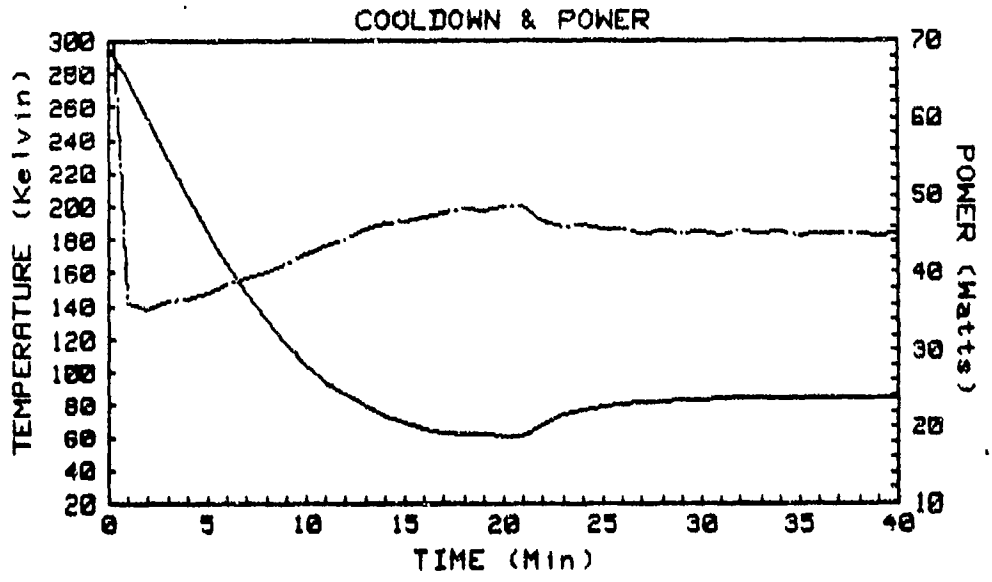
CRYOGENIC COOLER DATA

COOLER: CTI 7171
VOLTAGE: 117
AMBIENT:

DATE: 26 FEB 88 15:28
ENGR: R.N. SAMUELS
PROG: CATP* 1.0

TEST: POST RELIABILITY BASELINE

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	85.95	.001	295.61	0.000
1.00	36.06	.001	277.78	0.000
2.00	35.34	.001	253.11	0.000
3.00	36.36	.001	228.70	0.000
4.00	36.66	.001	206.01	0.000
5.00	37.44	.001	185.10	0.000
6.00	38.48	.001	165.93	0.000
7.00	39.24	.001	148.09	0.000
8.00	40.02	.001	131.80	0.000
9.00	41.27	.001	116.86	0.000
10.00	42.52	.001	103.52	0.000
10.37	42.89	.001	99.71	0.000
11.00	43.63	.001	93.60	0.000
12.00	44.33	.001	86.59	0.000
12.90	45.58	.001	80.01	0.000
13.00	45.77	.001	79.16	0.000
14.00	46.51	.001	73.36	0.000
15.00	46.72	.001	69.05	0.000
16.00	47.40	.001	65.96	0.000
17.00	47.77	.001	63.76	0.000
18.00	48.23	.001	62.36	0.000
19.00	48.03	.001	61.38	0.000
20.00	48.68	.001	60.76	0.000
30.00	45.34	.001	83.24	.911
40.00	45.24	.001	84.75	.911



NVEOL CRYOGENIC COOLER LAB

CRYOGENIC COOLER DATA

COOLER: CTI 7171
VOLTAGE: 117
AMBIENT:

DATE: 26 FEB 88 15:34
ENGR: R.N. SAMUELS
PROG: CATP* 1.0

TEST: POST RELIABILITY BASELINE

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	85.95	.001	295.61	0.000
1.00	36.06	.001	277.78	0.000
2.00	35.34	.001	253.11	0.000
3.00	36.36	.001	228.70	0.000
4.00	36.66	.001	206.01	0.000
5.00	37.44	.001	185.10	0.000
6.00	38.48	.001	165.93	0.000
7.00	39.24	.001	148.09	0.000
8.00	40.02	.001	131.80	0.000
9.00	41.27	.001	116.86	0.000
10.00	42.52	.001	103.52	0.000
10.37	42.89	.001	99.71	0.000
11.00	43.63	.001	93.60	0.000
12.00	44.33	.001	86.59	0.000
12.90	45.58	.001	80.01	0.000
13.00	45.77	.001	79.16	0.000
14.00	46.51	.001	73.36	0.000
15.00	46.72	.001	69.05	0.000
16.00	47.40	.001	65.96	0.000
17.00	47.77	.001	63.76	0.000
18.00	48.23	.001	62.36	0.000
19.00	48.03	.001	61.38	0.000
20.00	48.68	.001	60.76	0.000
21.00	48.60	.001	60.43	0.000
22.00	46.87	.001	68.48	.911
23.00	45.84	.001	73.83	.911
24.00	46.14	.001	76.97	.911
25.00	45.68	.001	79.05	.911
26.00	45.72	.001	80.43	.911
27.00	45.25	.001	81.43	.911
28.00	45.54	.001	82.20	.911
29.00	45.25	.001	82.82	.911
30.00	45.34	.001	83.24	.911
31.00	44.99	.001	83.62	.911
32.00	45.36	.001	83.93	.911
33.00	45.14	.001	84.12	.911
34.00	45.31	.001	84.24	.911
35.00	44.89	.001	84.35	.911
36.00	45.16	.001	84.64	.911
37.00	45.10	.001	84.71	.911
38.00	45.27	.001	84.71	.911
39.00	45.00	.001	84.75	.911
40.00	45.24	.001	84.75	.911
41.00	44.99	.001	84.75	.911

2	253.113944196
3	228.698663173
4	206.009176496
5	185.100622254
6	165.932632239
7	148.087553484
8	131.796162598
9	116.857289896
10	103.524806406
10.3666666667	99.706708152
11	93.6046194656
12	86.5873022716
12.9	80.0122564359
13	79.1633311002
14	73.3648599741
15	69.0511518845
16	65.9550753007
17	63.7577528
18	62.362862
19	61.3782332
20	60.7628402
21	60.4346306
22	60.4778043689
23	73.8256846855
24	76.9727049644
25	79.0480349878
26	80.434679088
27	81.4331326293
28	82.2011738149
29	82.8156067635
30	83.2380294156
31	83.6220500084
32	83.9292664826
33	84.1212767791
34	84.2364829569
35	84.3516891348
36	84.6400886
37	84.7135683612
38	84.7135683612
39	84.7503082418
40	84.7503082418

APPENDIX E
MILITARY SPECIFICATIONS

6 March 1986
SUPERSEDING
MIL-C-49175A(ER)
11 June 1982

MILITARY SPECIFICATION

COOLER, CRYOGENIC, MECHANICAL HD-1033B/UA and HD-1033C/UA

This specification is approved for use by USACECOM, Department of the Army and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers one type of common module with 2 interchangeable models; Cooler, Cryogenic, Mechanical HD-1033B/UA and HD-1033C/UA.

2. APPLICABLE DOCUMENTS

2.1 Government documents. The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this specification to the extent specified herein. In the event of a conflict between the document referenced herein and the contents of this specification, the contents of this specification shall be considered a superceding requirement.

SPECIFICATIONS

MILITARY

MIL-P-116	- Preservation-Packaging, Methods of
MIL-P-11268	- Parts, Materials, and Processes Used in Electronic Equipment
MIL-E-55585	- Electronic Equipment and Parts, Packaging of

STANDARDS

MILITARY

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-252	- Classification of Visual and Mechanical Defects for Equipment, Electronic, Wired, and Other Devices
MIL-STD-454	- Standard General Requirements for Electronic Equipment
MIL-STD-704	- Electrical Power, Aircraft Characteristics and Utilization of

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: HQ, USA Communications - Electronics Command and Fort Monmouth, ATTN: AMSEL-ED-TO, Fort Monmouth, NJ 07703 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 5855

MIL-STD-726 - Packaging Requirement Codes
MIL-STD-810 - Environmental Test Methods

DRAWINGS

USA ELECTRONICS R&D COMMAND

SM-D-969477 - Cooler, Cryogenic, Mechanical HD-1033B/UA
SM-D-971500 - Cooler, Cryogenic, Mechanical HD-1033C/UA
54490-5004372 - Cryogenic Heat Load Assembly (1 Watt Integral)

(Copies of specifications, standards, drawings and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated the issue in effect on the date of invitation for bids or request for proposal shall apply.

ANSI S1.11-1971 - Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets

(Application for copies of ANSI standards should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

3. REQUIREMENTS

3.1 Description. The Cooler, Cryogenic, Mechanical HD-1033B/UA and HD-1033C/UA, referred to herein as the cooler, is a closed-cycle refrigerator for cooling the infrared detector and interfacing with the Dewar of the infrared detector-Dewar package in an infrared system. The two models differ in their internal configuration but are identical in performance and external configuration. In system usage they are completely interchangeable.

3.2 Construction. The cooler shall be constructed in accordance with SM-D-969477 or SM-D-971500 and as specified herein.

3.2.1 Weight. The weight of the cooler shall be 3.7, (+0.1, -0.2) pounds.

3.3 First article. The contractor shall furnish first article assemblies in accordance with 4.3.

3.4 Materials, parts, and processes. Materials, parts, and processes shall be as specified herein and as shown on the applicable drawings. Materials, parts, and processes not specified shall be selected by the contractor in accordance with MIL-P-11268.

3.5 Components. The cooler shall consist of an ac motor-driven, helium-filled compressor with a coldfinger.

3.6 Performance characteristics. The cooler shall meet the performance characteristics specified herein when adequate heat sinking or convective cooling is

provided to ensure that any point on the cooler cylinder head shall fall within 5°C to 15°C above ambient air temperature.

3.6.1 Cooling capacity. The cooler with thermal load (copper mass) shall provide the minimum refrigeration capacity at 80 K maximum as shown in figure 1, curve A.

3.6.2 Cooldown time. The cooldown time to reach a cold tip temperature of 80 K from ambient with a 1440, (+25, -0) joule copper thermal mass (IAW Drawing 54490-5004372) (from 300 K to 80 K) shall be in accordance with figure 2.

3.6.3 Input power. The total input power to the cooler shall not exceed that shown in figure 3 with 1440, (+25, -0) joule thermal mass after cold tip temperature has stabilized with the heat load shown in figure 1, curve A. The input voltage shall be 117, ±2 volts alternating current (VAC), 400, ±20 hertz (Hz) power source.

3.6.4 Acoustic noise. The cooler noise emission shall not be more than the values listed below, when measured at a distance of 3 feet.

Sound pressure values

Center frequency (Hz)	Octave band (Hz)	Maximum sound pressure level (dB), reference 0.0002 microbar
125	87-175	45
250	175-350	45
500	350-700	48
1000	700-1400	55
2000	1400-2800	60
4000	2800-5600	65
8000	5600-11200	65

3.6.5 Leak rate. The leak rate of the cooler shall not be greater than 2.5×10^{-6} cubic centimeters per second (cc/sec) helium equivalent at an ambient temperature of +23°C, ±5°C.

3.6.6 Vibration output. The maximum amplitude, at the ambient temperature of +23°C, ±5°C, of the vibrational force induced by the cooler at a frequency of 26, ±4 Hz or any of the next eight harmonics along the compressor piston and coldfinger axes shall not exceed 0.35 pound (semi-amplitude) and shall not exceed 0.5 pound (semi-amplitude) along the motor axis. The maximum amplitude of the torque induced by the cooler about the motor, piston and coldfinger axes at 26, ±4 Hz or any of the next eight harmonics shall not exceed:

a. 4.0 in-oz (semi-amplitude) compressor piston axis
b. 4.0 in-oz (semi-amplitude) coldfinger axis
c. 15.0 in-oz (semi-amplitude) motor axis.

3.6.7 Restart. The cooler shall restart after having cooled to the operating temperature of at least 80K at any ambient from - 54C to + 71C.

3.7 Environmental conditions.

3.7.1 Temperature shock. The cooler shall not be damaged (see 6.3.1) by sudden changes in temperature between -62°C and +95°C.

3.7.2 High temperature. The cooler shall not be damaged by storage to +95°C or operation up to +71°C.

3.7.3 Low temperature. The cooler shall not be damaged by operation to -54°C or storage to -62°C.

3.7.4 Shock. The cooler shall not be damaged by high intensity shocks of 100 g's peak amplitude with 11 milliseconds duration and by bench handling tests.

3.7.5 Vibration. The cooler shall not be damaged by vibration over a frequency spectrum at the specified g levels and amplitudes shown in figure 4.

3.8 Burn-in. Each cooler delivered shall have accumulated a minimum of 12 hours burn-in over the temperature profile in accordance with figure 5.

3.9 Reliability. The cooler shall have a lower mean-time-to failure (MTTF) of at least 1,000 hours.

3.10 Treatment. Unless otherwise specified, the cooler and its components and parts shall be cleaned and treated in accordance with the applicable drawing.

3.11 Nameplates and product marking. Unless otherwise specified, the cooler, parts, components, subassemblies, and assemblies thereof shall be marked for identification and reference designation markings in accordance with the applicable drawing.

3.12 Workmanship. Workmanship shall be in accordance with MIL-STD-454, Requirement 9.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsiblity for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections. Inspections shall be classified as follows:

a. First article inspection (see 4.3).
b. Quality conformance inspection (see 4.5).
c. Inspection of packaging (see 4.10).

4.3 First article inspection. Unless otherwise specified in the contract, the first article inspection shall be performed by the contractor.

4.3.1 Inspections. All materials, parts, processes and assemblies shall be examined for conformance to the applicable specification or drawing. Inspections shall be made using MIL-STD-105, General Inspection Level II with a 2.5 percent AQL for mechanical and a 4 percent AQL for visual inspection, except as noted in table I.

TABLE I. Inspections.

Inspection Requirement	Percent AQL	Requirement paragraph	Inspection criteria
Any part or component missing or damaged	2.5	3.2, 3.4	MIL-STD-252
Weight not as specified	2.5	3.2.1	MIL-STD-252
Treatment not as specified	2.5 1/	3.10	
Marking not as specified	2.5	3.11	
Workmanship not as specified	2.5	3.12	MIL-STD-454
Dimensions not as specified		3.2	SM-D-969477 or SM-D-971500

1/ MIL-STD-105, Inspection Level S-3 or objective quality evidence.

4.3.2 Test. Upon successful completion of the inspections specified in 4.3.1, four first article coolers shall be subjected to reliability testing and 2 first article coolers shall be subjected to all other tests listed in table II. Tests may be conducted in any order. Failure of any test shall constitute first article failure.

4.3.3 Disposition of first article samples. First article samples shall not be considered as part of the procurement quantities (see 6.2.f).

TABLE II. First article inspection.

Inspection	Requirement paragraph	Test paragraph
Cooling capacity	3.6.1	4.6.1
Cooldown time	3.6.2	4.6.2
Input power	3.6.3	4.6.3
Acoustic noise	3.6.4	4.6.4
Leak rate	3.6.5	4.6.5
Vibration output	3.6.6	4.6.6
Restart	3.6.7	4.6.7
Temperature shock	3.7.1	4.7.1
High temperature	3.7.2	4.7.2
Low temperature	3.7.3	4.7.3
Shock	3.7.4	4.7.4
Vibration	3.7.5	4.7.5
Reliability	3.9	4.9

4.4 Inspection procedures for quality assurance provisions. Unless otherwise specified herein, the cooler shall be operated at an ambient temperature of +23°C, ±5°C. Adequate heat sinking or convective cooling shall be provided to ensure that any point on the cooler cylinder head shall fall within 5°C to 15°C above ambient air temperature (see 3.6).

4.5 Quality conformance inspection.

4.5.1 Inspection. Inspection shall be as specified in 4.3.1.

4.5.2 Tests.

4.5.2.1. Burn-in. Burn-in shall be in accordance with 4.8 and shall be performed upon each cooler that has passed the inspection of 4.5.1.

4.5.2.2 Group A inspection. Group A inspection shall be conducted on all coolers which have completed burn-in specified in 4.5.2.1. Group A tests listed in table III may be performed in any order unless otherwise specified. Failure of any test shall be cause for rejection of that unit.

TABLE III. Group A inspection.

Inspection	Requirement paragraph	Test paragraph
Cooling capacity	3.6.1	4.6.1
Cooldown time	3.6.2	4.6.2
Input power	3.6.3	4.6.3
Leak rate	3.6.5	4.6.5
Restart	3.6.7	4.6.7

4.5.2.3 Group B inspection. Not required.

4.5.2.4 Group C inspection. Group C inspections shall be conducted on coolers selected from units which have passed the tests in 4.5.2.2 (see 6.2.h). The sample(s) shall be tested in accordance with the inspections listed in table IV. Samples shall be selected in accordance with 4.5.2.4.1. Group C tests listed in table IV may be performed in any order.

4.5.2.4.1 Sampling for group C inspection. Group C samples shall be selected as follows:

Monthly lot size	Number of sample units monthly
1-99	1
100-299	3
300-499	5
500-999	7
1000 or more	10

TABLE IV. Group C inspection.

Inspection	Requirement paragraph	Test paragraph
Acoustic noise	3.6.4	4.6.4
Vibration output	3.6.6	4.6.6
Temperature shock	3.7.1	4.7.1
High temperature	3.7.2	4.7.2
Low temperature	3.7.3	4.7.3

4.5.2.4.2 Group C failures. Actions required relative to group C failures shall be specified in the contract (see 6.2.c.(2)).

4.5.2.4.3 Disposition of group C samples. Group C samples shall be accepted on contract subsequent to the tests of table III.

4.5.2.5 Group D inspection. Group D inspections shall be conducted on coolers selected from units which have passed the tests in 4.5.2.2. The samples shall be tested in accordance with 4.9.

4.5.2.5.1 Sampling for Group D inspection. The reliability acceptance test sample size shall be 4 units. The sample shall be randomly selected from units produced during the sampling period. The frequency of the test shall be as follows:

Monthly Lot Size	Frequency of Group D Inspection
1-9	None
10-49	Annual
50 or more	Semiannual

4.5.2.5.2 Group D Failures. Actions required relative to group D failures shall be specified in the contract (see 6.2.c.(3)).

4.5.2.5.3 Disposition of Group D Samples. Group D samples shall not be considered as part of the procurement quantities (see 6.2.f).

4.6 Test methods.

4.6.1 Cooling capacity. The cooling capacity shall be measured by attaching to the cooler a test Dewar and coldstation. The heat load shall be applied 30 minutes after achieving cooldown. Capacity shall be measured not less than 20 minutes later. The tests of paragraphs 4.6.1, 4.6.2 and 4.6.3 shall be performed using test equipment consisting of the following items to measure cooldown and refrigeration capacity:

1. Test dewar

2. Coldstation

3. Appropriate power supplies and meters

4. High vacuum source

a. The test dewar shall be made of either brass or aluminum with a highly polished surface finish of at least an 8 RMS. The test dewar in conjunction with the high vacuum source shall enclose the coldfinger and coldstation in a vacuum of $1x10^{-5}$torr or lower.

b. The 1440 joule coldstation shall consist of the following elements as defined on drawing 54490 5004372: copper block, temperature sensor, resistor, thermally conductive epoxy and a clamp screw.

c. The coldstation assembly will have the following characteristics:

1. The temperature sensor and resistor will be bonded to the copper block with the thermally conductive epoxy.

2. The thermal energy which must be removed when cooling the coldstation from 300 K to 80 K shall be 1440, (+25, -0) joules. The mass of the coldstation shall be adjusted until it meets this requirement.

3. The resistor in the coldstation shall have a voltage applied to obtain a 1000, (+20, -0) mw thermal load. The applied voltage shall be such that the product of the voltage and the current of the resistor shall equal 1000, (+20, -0) mw.

4. The resistor and temperature sensor shall be connected to a vacuum feedthru by four teflon coated constantan wires. The wires shall be less than six inches in length and the resistance shall be less than one percent of the value of the resistor in the coldstation.

5. The coldstation is clamped to the coldfinger, sufficiently tight to effect good heat transfer without damaging the coldfinger.

6. Good thermal conductivity is assured by applying a metal oxide impregnated silicone thermal joint compound to the end of the coldfinger that is in contact with the coldstation.

7. A radiation shield shall not be used.

4.6.2 Cooldown time. Cooldown time shall be measured using the test Dewar and the copper mass described in 4.6.1. Failure to meet requirements of 3.6.2 shall constitute failure of this test.

4.6.3 Input power. Input power shall be measured when the cold tip temperature has stabilized below 80 K with heat load applied. Temperature stabilization has occurred when the output of the temperature sensor diode does not change more than .015 Vdc over a 5 minute period. Failure to meet requirements of 3.6.3 shall constitute failure of this test.

.6.4 Acoustic noise. The cooler shall be set up for operation in an area where the background noise level is at least 5 dB below the sound level to be measured. The cooler shall be operated and sound pressure measurements made with the cooler oriented in 4 positions in the same plane with each position approximately 90 degrees apart. Measurements shall be made with an octave-band analyzer with characteristics which comply with ANSI Specification S1.11-1971. Failure to meet requirements of 3.6.4 shall constitute failure of this test.

4.6.5 Leak rate. The cooler shall be placed in a bell jar or suitable fixture connected to a helium mass spectrometer. The bell jar or fixture shall be evacuated to establish an inside-out test mode. Operating test shall not be performed during leak rate test. The leakage rate shall be measured at +23°C, ±5°C ambient. Failure to meet requirements of 3.6.5 shall constitute failure of this test.

4.6.6 Vibration output. The cooler shall be turned on for 15 minutes to allow it to reach equilibrium temperature. The cooler shall be vertically suspended such that the fundamental frequency of the cooler is much higher than the natural frequency of the suspension system. The static deflection of this arrangement shall be in excess of 6 inches and critical frequency (f_{cr}) of 1.3 Hz approximately. The acceleration along each axis shall be obtained by attaching an accelerometer to the center of the piston and motor faces and to the unit centered on the coldfinger axis. Moments around each axis shall be obtained by attaching two accelerometers (to the motor, piston face or coldfinger face) and coherently subtracting the two signals. This difference divided by the separation distance between the accelerometers yields the angular acceleration. Moment of inertia shall be obtained from the period of a bifilar pendulum containing the cooler. Peak forces are derived from the expression F = MA, where F is the peak force. M is the cooler mass, and A is the measured acceleration at a given frequency. Peak torque is derived from the expression T = I , where T is the peak torque, I is the moment of inertia about the principal axis, and is the measured angular acceleration for the applicable axis at a given frequency. Failure to meet requirements of 3.6.6 shall constitute failure of this test.

4.6.7 Restart. The cooler shall be operating at 80K or less in a 23C ± 5C ambient. The power switch shall be turned off and the cooler motor shall be at rest. The power switch shall be turned on and the cooler must start within 5 seconds. This test shall be repeated a total of twenty times. The cooler shall also be tested at -54C and +71C using the above procedure during the high and low tests of 4.7. The restart test shall be performed after the cooldown and cooling capacity tests. Failure to meet the requirement of 3.6.7 shall constitute failure of this test.

4.7 Environmental tests. Unless otherwise specified, the environmental tests shall be performed in accordance with MIL-STD-810. The operating tests required before and after environmental tests shall be those specified in table III. During 4.7.2 and 4.7.3, operating test 4.6.1, 4.6.2, 4.6.3 and 4.6.7 shall be performed and must be successfully completed. Operating tests are not required during 4.7.1, 4.7.4 and 4.7.5 except that the unit under test shall have power applied during 4.7.4 (Procedure IV only) and 4.7.5.

4.7.1 Temperature shock. The cooler shall be tested in accordance with MIL-STD-810, Method 503.1, Procedure I except that the temperature of step 2 shall be -54°C and the temperature of step 1 and step 4 shall be +95°C. Failure to meet requirements of 3.7.1 shall constitute failure of this test.

4.7.2 High temperature. The cooler shall be tested in accordance with MIL-STD-810, Method 501.1, Procedure I (see figure 6) except that the temperature of step 2 shall be +95°C. The temperature of steps 4 and 5 shall be +71°C. Failure to meet requirements of 3.7.2 shall constitute failure of this test.

4.7.3 Low temperature. The cooler shall be tested in accordance with MIL-STD-810, Method 502.1, Procedure I (see figure 7) except that the storage temperature of step 2 shall be -62°C and low operating temperature of step 4 shall be -54°C. Failure to meet requirements of 3.7.3 shall constitute failure of this test.

4.7.4 Shock. The cooler shall be tested in accordance with MIL-STD-810, Method 516.2, Procedure IV, figure 516.2-1 (100 g's peak value at 11 milli-seconds time duration) and Procedure V. Failure to meet requirements of 3.7.4 shall constitute failure of this test.

4.7.5 Vibration. The cooler shall be tested in accordance with MIL-STD-810, Method 514.2, Procedure VIII except that the curve shown in figure 4 of this specification shall be used in lieu of the MIL-STD-810 curve. The sinusoidal cycle time shall be 120 minutes per axis. The dwell time shall be 1/6 of the cycling time at each resonance. Failure to meet requirements of 3.7.5 shall constitute failure of this test.

4.8 Burn-in. Each cooler shall be subjected to a minimum of 12 hours burn-in in accordance with figure 5. Failure of burn-in shall be defined as failure to pass the inspections listed in table III after burn-in. Any unit which fails and is repaired or is later altered, repaired or reworked, shall be resubjected to burn-in.

4.9 Reliability.

4.9.1 Reliability. The lower MTTF shall be demonstrated using 4 coolers in accordance with the reliability test cycle shown in figure 8. Heat load, input power, cold tip temperature and ambient temperature shall be monitored hourly. Cooldown time shall be measured twice during each cycle of figure 8, at -32°C and +52°C. The tests of paragraph 4.9.1.1 shall be performed at least once prior to and once after the reliability test. The results of all 4.9.1.1 tests shall be used to determine the success or failure of the reliability test.

4.9.1.1 Failure definition. Failure shall be defined by any one of the four criteria below:

a. Inability to cool at least 90% of heat load carrying capability in accordance with figure 1, curve C at any ambient measured at 90 K when measured at any point during the 40-hour reliability cycle.

b. Failure to cooldown to 90 K in 15 minutes.

c. Failure to meet 55 watts input power when measured at any point during the 40-hour reliability cycle.

d. Failure to meet the leak rate requirement of 3.6.5.

Should a failure occur in one of the four categories above, the hours accumulated since completion of the previously successful test, shall not be included in the accept/reject decision.

4.9.1.2 Accept/Reject decision. The accept/reject decision shall be made by the Government in accordance with the following definition. Four coolers shall be run until 4000 total "on" hours have been accumulated. A cooler which experiences a relevant failure as determined by the Government shall not be repaired and put back into test. No single unit "on" time shall be less than ½ the average operating time of all units on test and no single unit "on" time shall be greater than 1.25 the average operating time of all units on test.

4.10 Inspection of packaging. Packaging shall be inspected in accordance with MIL-P-116 to determine compliance with requirements of section 5.

5. PACKAGING

5.1 Preservation. Preservation shall be as specified in MIL-STD-726, coded as follows:

5.1.1 Level A. 10-1-1-00-NS-X-ED-0-00-A.

5.1.2 Level B. 10-1-1-00-NS-X-ED-0-00-B.

5.2 Packing and marking. Packing and marking shall be in accordance with MIL-E-55585.

6. NOTES

6.1 Intended use. The cooler is intended for use in infrared systems.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number, and date of this specification.

b. First article tests are required except for existing suppliers (6.3.2).

1. Time frame for submission of first article test reports when first article tests are required.

2. Time frame for approval of first article test reports when first article tests are required.

c. Production delivery schedule.

1. Defined in terms of monthly lots.

2. Actions required relative to group C failures.

3. Actions required relative to group D failures.

d. Level A or level B preservation and packaging (the coldfinger is extremely delicate; packaging shall protect it from bending or distortion)(see section 5).

e. MIL-STD-810C shall be used for environmental tests of 4.7.

f. Deliver all first article and Group D samples to - Commander, USACECOM, ATTN: AMSEL-NV-CM, Fort Belvoir, VA 22060.

g. Environmental pollution prevention measures are contained in the packaging material specifications referenced herein. Refer to material specification or preparing activity for recommended disposability methods.

h. Group C and Group D inspection sample size to be established based on cumulative totals of concurrent contracts.

i. Suppliers are those who are currently supplying equipment to this specification with a minimum average monthly rate of 10 units per month over the most current 12 month period. If a supplier cannot maintain the minimum monthly average, a first article test (less reliability) performed annually shall sustain the existing supplier's status when performed on 3 units manufactured by the supplier explicitly for this test. Upon implementation of this specification, suppliers who are then supplying equipment to specification 82-28A050108, Cooler, Cryogenic, Mechanical HD-1033/UA, HD-1033A/UA with minimum monthly delivery rates specified above, shall be considered as existing suppliers.

6.3 Definitions.

6.3.1 Damage. Breakage, loosening, shifting, evidence of corrosion, or failure of any finish, hardware, connection or component; and any degradation of cooler performance to values less than specified herein.

6.3.2 Lower mean time to failure. The term "Lower" is used to define that value which is the least operational capability and/or the maximum operating and support cost burden the army can tolerate and accept. This distinction is made to aid the system designer is allocating reliability characteristics of the device.

6.4 Design note. Cooler input power will increase when tested with a dewar (0.4 WHL) from 50 w to 53 w at 23°C ambient temperature and from 55 w to 60 w at 71°C ambient temperature.

CUSTODIAN:
Army CR

PREPARING ACTIVITY:
Army CR

Project 5855-A271

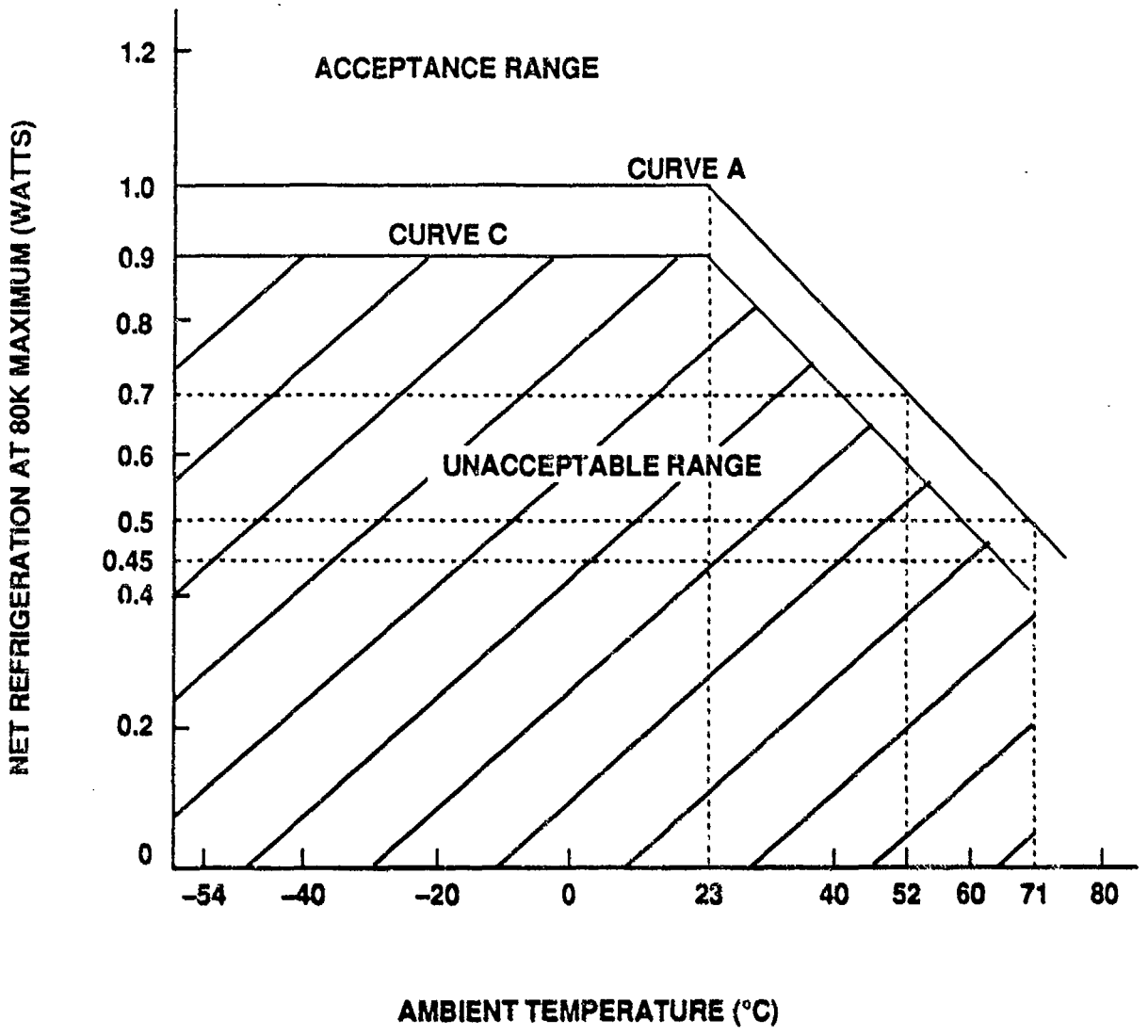


Figure 1. Cooling Capacity

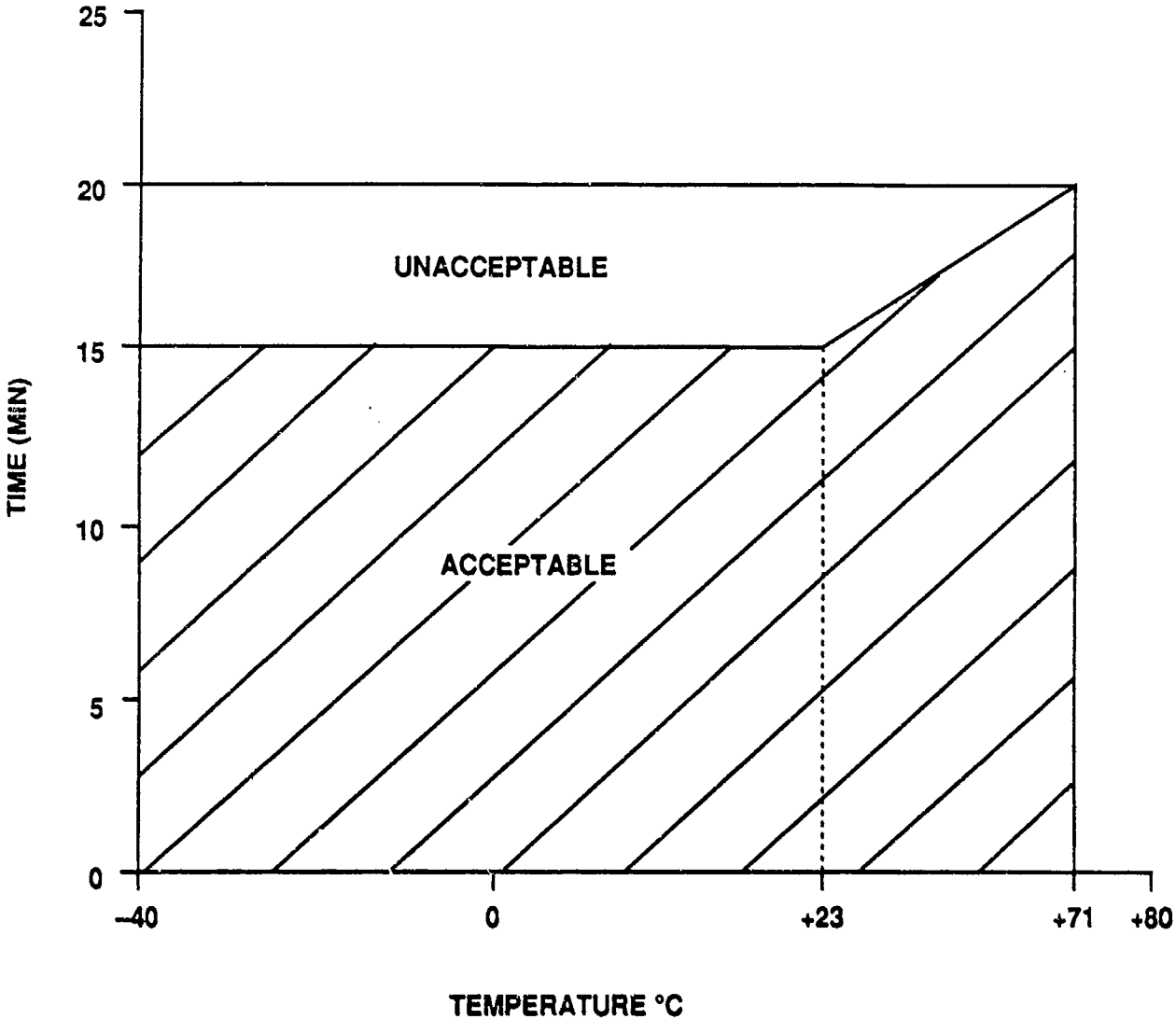


Figure 2. Cool Down Curve

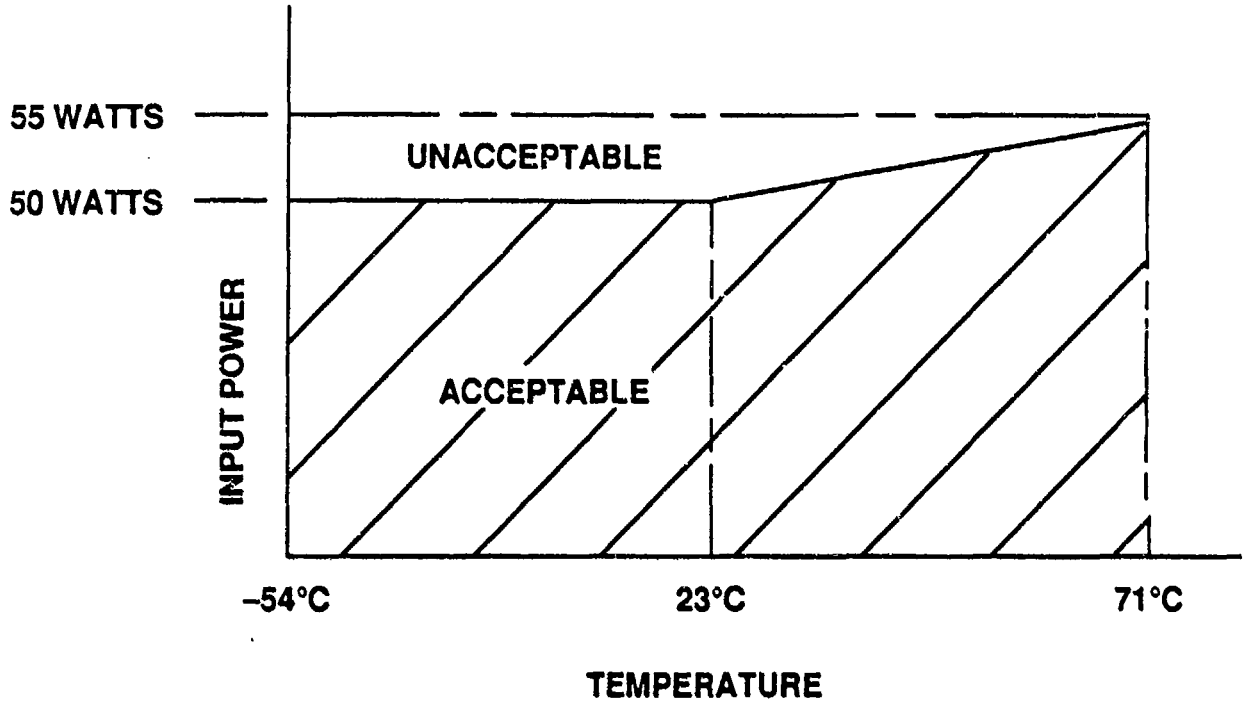


Figure 3. Input Power with Heat Load Applied

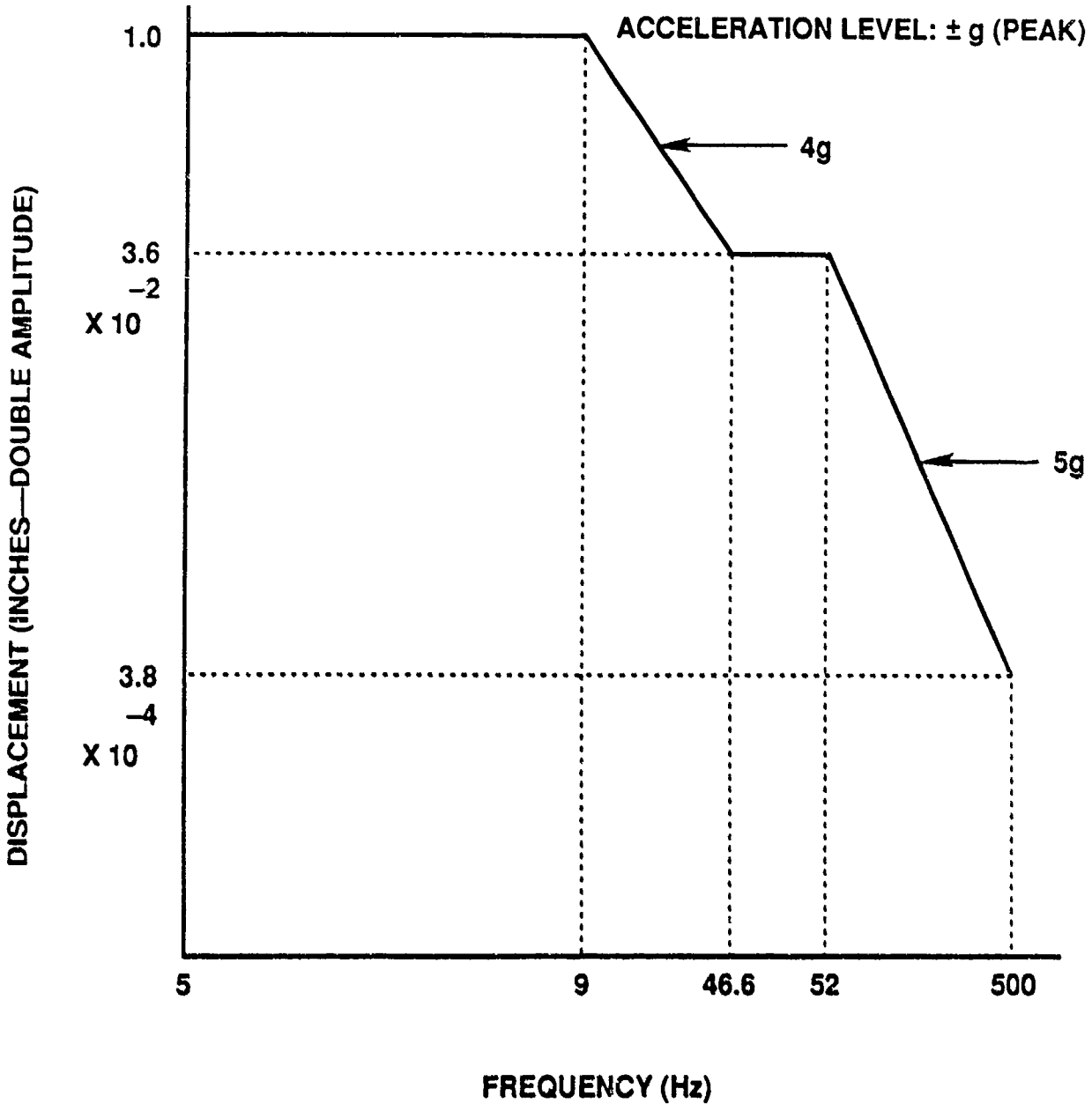
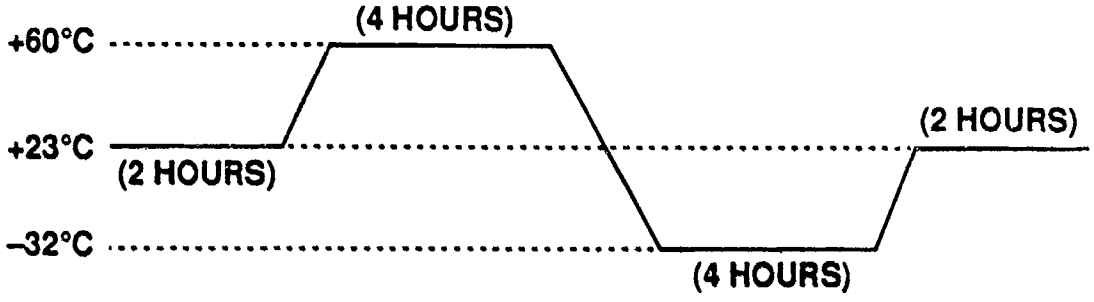
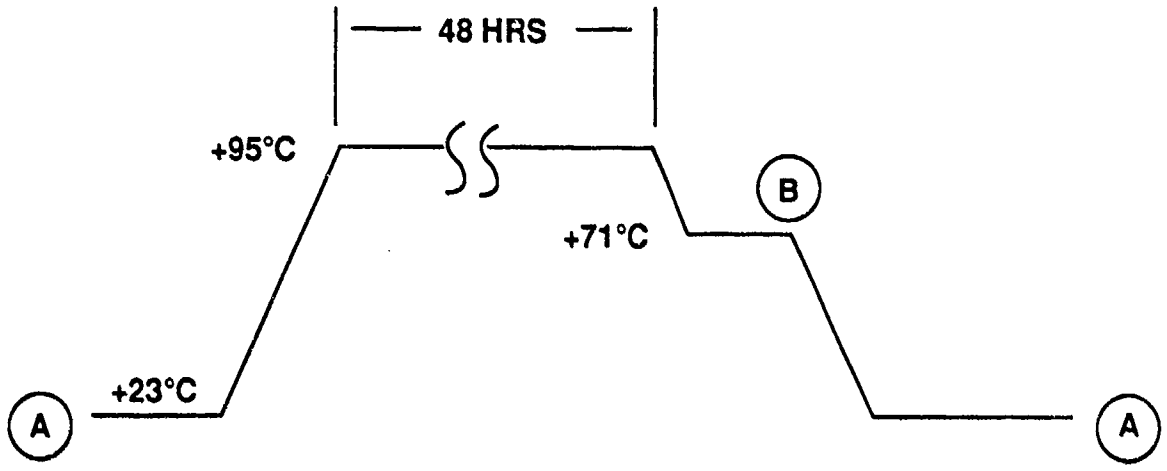


Figure 4. Vibration Test Profile



1. CHAMBER TEMPERATURE EXTREMES SHALL NOT VARY MORE THAN 5°C PER HOUR.
2. RATE OF CHAMBER TEMPERATURE CHANGE SHALL AVERAGE LESS THAN 5°C PER MINUTE.
3. UNIT OPERATES THROUGH FULL CYCLE.

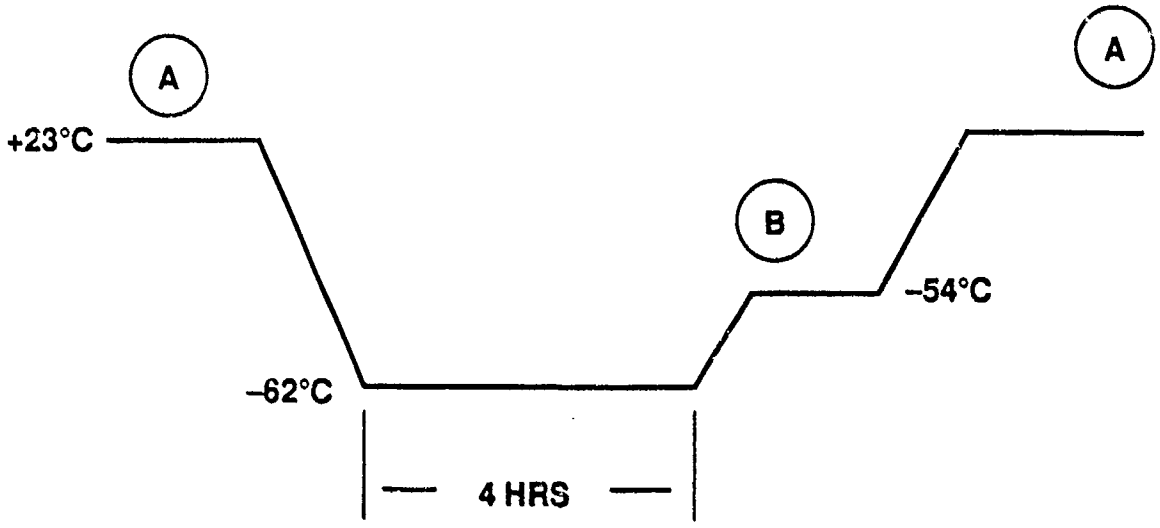
Figure 5. Burn-In



(A) GROUP A TESTS (TABLE III) ARE CONDUCTED AT THESE POINTS.

(B) COLDFINGER TEMPERATURE WITH 0.5 WATT APPLIED HEAT LOAD MONITORED AT THIS POINT TO VERIFY ABILITY OF COOLER TO MAINTAIN 80K TEMPERATURE.

Figure 6. High Temperature Test Profile



(A) GROUP A TESTS (TABLE III) ARE CONDUCTED AT THESE POINTS.

(B) COLDFINGER TEMPERATURE WITH 0.8 WATT APPLIED HEAT LOAD MONITORED AT THIS POINT TO VERIFY ABILITY OF COOLER TO MAINTAIN 80K TEMPERATURE.

Figure 7. Low Temperature Test Profile

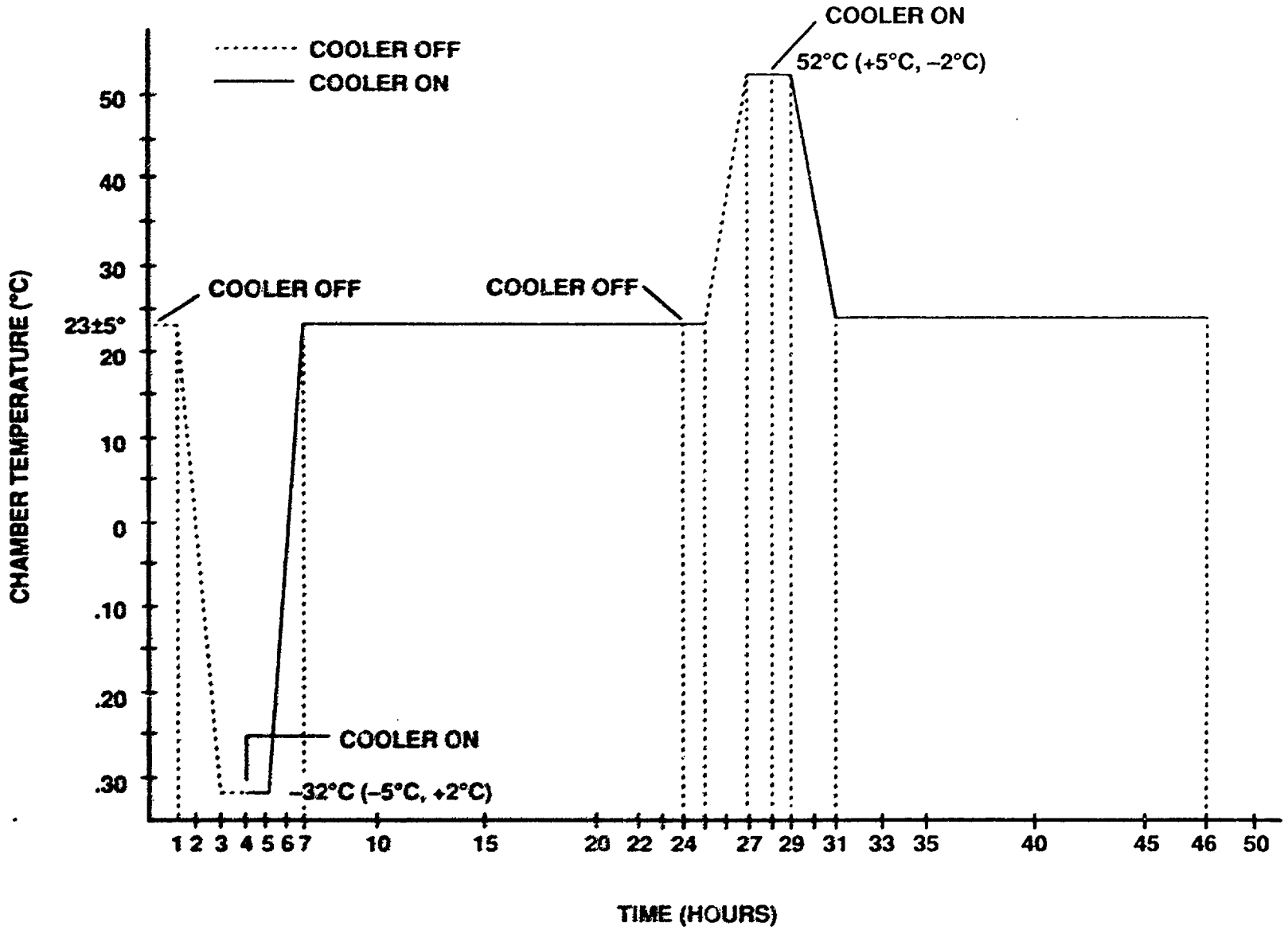


Figure 8. Life Test

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